Cement MILL SECTION of

Concrete

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British Columbia Plant Contains Unique Features

By Henry Anderson

Works Manager, British Columbia Cement Co., Ltd.

The Bamberton Plant of the British Columbia Cement Co., Ltd., is situated on the west side of Saanich Inlet, Vancouver Island, approximately 20 miles from Victoria, and contains several unique features in both the layout and the process of manufacture.

Briefly, it is a wet process plant using hard limestone and shale, with a rated capacity of 2000 barrels per day, and was built in 1912. The shale is quarried about six miles further up the Saanich Inlet near the famous Goldstream, where the company owns extensive deposits of hard shale. This is loaded on to scows and towed to the plant, where it is unloaded by steam crane, crushed and elevated to the rock bins situated over the wet ball mills.

The plant is built alongside the limestone deposit, and as the accompanying illustration will show, is at the base of a hill 1,600 ft. high, known as Mount Jaffray. Full advantage has been taken of the site to reduce labor, and the plant has been laid out on the gravity principle.

Referring to Fig. 1, the limerock quarry is situated on the left of the picture immediately in front of which is the crusher house with five holes in the side facing the sea. Immediately in front of this crusher house are the limerock and shale bins, and in front of these again is the raw grinding plant, consisting of ball and tube mills.

On the other side of the picture is the kiln room, below which in rotation are the cooler house, clinker hopper, dry mill, consisting of ball and tube mills, cooling mills, stock house, packing house and belt conveyor out to the concrete loading wharf. A little to the left of the ocean freighter shown in the picture is the coal plant consisting of Raymond mills and Buckeye dryers. The pulverized coal is elevated by fans to the cyclones which are shown immediately above the oil tank, and then by elevators and conveyors to the ground coal bin on the kiln floor. In addition to the coal plant, the company has an oil burning plant so that either can be used as necessity warrants. The works village is located up on the mountain side to the right beyond the kilns.

The floor of the quarry is 74 ft. above tidewater, and has been worked as a single face since 1913. Arrangements are now being made to bench this face, as the working has carried it back so far that the depth, nearly 200 ft., is not suitable for working economically. Ordinary tripod drills are used, 10 to 15 holes 20 ft. deep being drilled along the face and shot. The rock

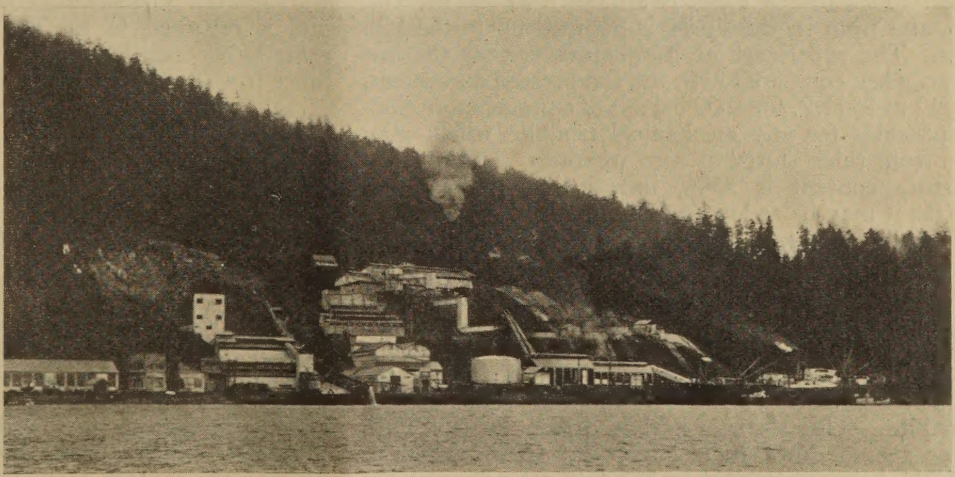


Fig. 1—General View of Plant of British Columbia Cement Co., Ltd., Showing Plant Lay-Out on Side of Mount Jaffray, and Water Shipping Facilities

is then loaded into cars by a 25 B. Bucyrus shovel. Wire rope haulage is used to haul the cars up an incline over a No. 8 Allis-Chalmers crusher. Here the cars are dumped automatically, and then reloaded, gravity carrying them back to be spotted for reloading. From the No. 8 crusher, the rock falls over a grizzly, allowing the small pieces of rock to pass direct to the belt conveyor, the large pieces going to two No. 5 crushers set to crush to 1½-in. ring size. From this point, the rock is conveyed by belt conveyor to the limerock bins. The rock bins, both shale and limerock, are built of reinforced concrete, sufficient storage capacity for two days' run of the plant being provided. The crushed rock is drawn off at the bottom of the different bins, and falls on to table feed gears with scrapers set to proportion the feed for the ball mills, roughly three of limestone to one of shale. On its way down the chute to the ball mill, water is added by a measuring machine set so that a predetermined amount of water is added, any change in the feed being accompanied by a corresponding change in the quantity of water fed to the mill.

The preliminary grinding is carried out in ball mills with the inlet in one side and the outlet in the other side. When discharged from the mill, the product is too rough for tube mill feed, and is accordingly elevated to "Trix" separators, the fines being fed to the tube mills and the residue returned to the ball mill for regrinding. The tube mills for finishing are lined with Belgian Silex, and loaded with local pebbles. A fineness of 5% to 6% residue on a 200 mesh sieve is aimed at, and very little difficulty is experienced in keeping around this figure. Five units are housed in the raw mill, each consisting of a 10-ft. x 6-ft. ball mill and a 6-ft. x 24-ft. tube mill. Each machine is driven by a separate motor of 160 H.P. From the tube mills, the slurry flows to a pump sump, where it is pumped up to an elevation of 80 ft. to the slurry storage basins, four in number. Each basin holds the equivalent in slurry of 3,000 barrels of cement, which is constantly agitated by a mechanical mixing machine fitted with four stirrers which are slowly carried round the basin. In addition to providing storage, the "mixers", as they are termed, perform another important function, viz., when the slurry is pumped from the raw mill, it is only delivered into one or other of two mixers, one being reserved for a high mix above 73% of carbonate of lime, and the other for a low mix, i. e., below 73%. A third basin is reserved for correcting and when necessary, a predetermined quantity is allowed to flow from either of the two mixers mentioned above. After being agitated and stirred for several hours, the slurry, if of the correct composition, is pumped over to the fourth basin or mixer. This fourth basin is always reserved for kiln feed, and from it the slurry is pumped up to the kiln feeds. The experience at Bamberton is that the low power, when compared with the compressed air system, viz., 12 to 15 H.P. for 3000 barrels of storage, more than compensates for any mechanical troubles which may arise from thick slurry or zero weather. The average moisture content is 33%, but during the summer months it may be as low as 32%.

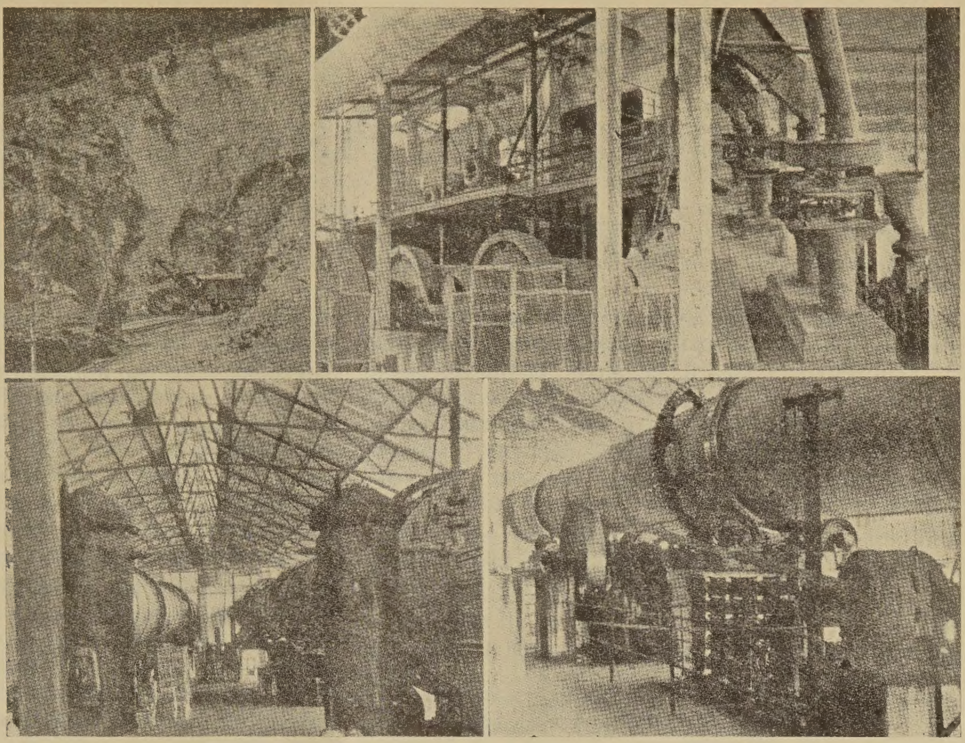
The kilns are two in number, 8 ft. 9 in. in diameter by 185 ft. long, and were designed for an output of 1000 barrels each per day when using slurry at 32% moisture. Each kiln is provided with a steel smoke stack 6 ft. internal diameter, 100 ft. high, which is lined with 4 in. of firebrick right to the top. Over the flue at the back end, a slurry feeding device is fixed for each kiln. This slurry wheel is driven by a 1 H.P. motor geared down to a convenient speed, which is variable, being controlled by the kiln attendant at the platform or firing end. A constant supply of slurry is being continually pumped from the mixer reserved for kiln feed. This supply is arranged to be rather more than the kiln requires, in order to insure the feeder having a plentiful supply. Any excess runs back to the mixer after it passes the feeder and is pumped over again. The kilns are each driven by a 60 H.P. variable speed motor, controlled from the firing platform. Originally, the kilns were equipped for burning oil, and a change from coal to oil can be made in from two to three days. In 1921 a coal grinding plant was installed, oil having been unobtainable for several years.

Vancouver Island coal is brought by scow from the mines, and unloaded by a marine leg on to a belt conveyor which in turn delivers the coal to the distributing conveyor situated over the coal storage bins. From storage it is drawn off as required by means of a screw conveyor in the floor, and delivered to the bins feeding the two coal driers. After passing through the driers, the dry coal is elevated and discharged into the dry coal storage bins situated over the grinding mills. The dryers are two Buckeye, Type B. 60-in. x 30-ft. machines, and regularly dry four to four and a half tons of coal per hour, the raw coal having a moisture content of 9% to 10% and the dry coal .9% to 1.25%. The grinding mills are two five-roller lowside Raymond mills, each having a capacity of four to four and a half tons per hour, when grinding to 94% to 95% through one hundred mesh, with a moisture content of 1% to 1½% in the dry coal. A 60 H. P. motor drives the two driers and all the auxiliaries. Each Raymond mill is driven by independent motors of 60 H.P. each, and the fans which draw off the ground coal are each driven by 40 H.P. motors.

As mentioned above, the plant is arranged on the gravity principle, the kiln being situated at an elevation of 174 ft. above tidewater. The coal grinding plant is practically at tidewater level. Advantage is taken of this arrangement to utilize the energy in the delivery from the fans, and by this means the powdered coal is raised the first stage, approximately 90 ft., and discharged into cyclone collectors which in turn deliver it to a 12-in. screw conveyor. The remaining two stages each 40 ft. are dealt with by elevators in the ordinary manner, and the coal is ultimately delivered into a concrete storage bin situated alongside the firing end of the kilns. The capacity of this bin is approximately 80 tons of ground coal, and from the bottom the coal is extracted by screw conveyors and delivered to the variable speed feeders, being blown into the kiln by fan blast in the usual way. A feature of the coal feeders which are friction driven is that they always run buried in coal, and the amount delivered to the kiln depends upon the speed of the feeder, which can be varied within wide limits. The surplus coal passes on past the feeder and is returned to the storage bin. This insures a remarkably regular and uniform feed for the kiln. Since it was put to work in 1921, the coal handling and grinding installation has been in operation constantly without a hitch, except for the usual renewals to the grinding mills. The point which impresses visitors most is the entire freedom from coal dust in this powdered coal installation.

Returning to the kilns. In front of these is a steel platform with ample room for carrying out repairs and situated here the kiln attendants have everything under control, viz., flue dampers, kiln speed, slurry feed and coal feed. On a lower level and partly under the platform, are situated the rotary clinker coolers of the usual type, lined at the hot end with 20 ft. of firebrick, and the remaining 50 ft. with hard cast iron plates and lifter bars which continually lift and drop the clinker, causing the greater part of the sensible heat to be returned to the kiln with the air for combustion, 30%

Fig. 2—(Upper Left) Quarry Operations. Mill Equipment Including Raw Grinding Mill, Automatic Proportioning Machines and Kilns



to 40% of which passes up the cooler. From the coolers, the clinker drops into a reinforced concrete clinker bin which has a storage capacity of 20,000 barrels. Immediately in front of and below the clinker bin is the cement grinding mill. Installed in this building are four units each consisting of a 6-ft. x 15-ft. steel ball tube mill for preliminary grinding, and a 6-ft. x 24-ft. finishing tube mill. As in the wet mill, each mill is driven by a 160 H.P. motor. The clinker feed for each unit flows by gravity through openings at the bottom of the clinker bin, and is delivered on to revolving clinker feed tables with scraper knives, set so as to deliver a predetermined amount of feed. Alongside each clinker feed table is a similar table for gypsum. Both feed tables are driven by the same belt, the gypsum being ratchet driven at approximately 3% the speed of the clinker feed table. From the steel ball tube mill, the product falls through a chute to the feed box of the finishing tube mill. At this point is introduced the process known as "Bamber's" hydration process. The spindle carrying the feed screw is hollow and through this a jet of live steam at approximately 25 pounds pressure is fed continuously to the mill with the feed. This raises the temperature of the product and at the same time serves to hydrate any free lime particles that may be present in the clinker. From the finishing mill the cement again falls by gravity through 20 ft., and is fed into cooling mills, one for each pair of units, by which means the temperature can be reduced from 140° F. to 80° F. or thereabouts, depending upon the amount of cooling water used, and the temperature of the surrounding atmosphere. The British Columbia Cement Co. Ltd., claims that by this combination a sound cement is produced which does not require maturing, and can be used immediately upon any class of concrete work. The effect of the cooling is said to be that it gives the cement when worked neat or with sand, a "fat" smooth feel when trowelling, instead of the usual gritty and short feeling that freshly ground cement generally has.

From the cooling mills, the cement is conveyed to the cement silos which have a combined capacity of 70,000 barrels. From these, the cement is drawn off by extracting screws and conveyed to bins over the Bates bagging machines, four of which are installed. From the bagging machines, the sacks fall on to a belt conveyor 396 ft. long, which conveys them to the loading dock for shipment in steamers, scows, car barges, etc.

The company owns its own steamers, tugs and scows, and does all its own freighting within a range of 150 miles.

A study recently made by the Cement Information Service shows an increase of 64% or from 22,936,000 bbls. to 37,688,000 bbls., in portland cement consumption in the eastern states, between 1918 and 1922.

The profits of cement companies from 1913 to 1921 are reported now, as in the past, extremely low on an average. It is stated that the best year in the last decade was 1919, when the earnings of 19 eastern companies amounted to 6.7% on the capital invested in the business. In 1920, earnings were 4% and in 1921, they were 3.2%.

The average return earned on the investment for 19 eastern companies since 1913 as reported to the Government was as follows:

1913	4.8%	1918	2.9%
1914	5.3	1919	6.7
1915	1.0	1920	4.0
1916	6.3	1921	3.2
1917	3.8		

New rates were established on cement June 15 from Crestmore, Calif., to Avondale, Liberty, Buckeye, Chandler Junction, Chandler and Gilbert, Ariz., by order of the Interstate Commerce Commission. The Maricopa County, Ariz., Highway Commission and Twohy Brothers, highway construction contractors, complained that the present rates were unreasonable. The new rates from Crestmore, per 100 lbs., will be as follows: Avondale, 33c; Liberty, 34c; Buckeye, 34c; Chandler Junction, 31.5c; Chandler, 32c; and Gilbert, 32c.

National Lime Association Holds Important Meeting

At the meeting of the National Lime Association, the fifth annual convention at the Hotel Commodore, New York, June 13 to 15, George B. Wood, of the Rockland & Rockport Lime Corp., Rockland, Me., was elected president, and Fred Witmer, of the Ohio Hydrate & Supply Co., Woodville, Ohio, vice president. None of the other officers were changed because they are appointed.

Members commented freely upon the convention, saying that it was the best the Association has ever had.

The lime partition block and the quick-setting lime plaster were discussed thoroughly before all the persons in attendence, and it is generally accepted that the industry has made a great step forward for itself in development of two stable commercial products and has given to the construction industry two new articles which will very rapidly find important places. There is no attempt to make any secret of the process of manufacture and, in fact, all of these processes were discussed freely in the convention sessions and in the lobby. Patents have been applied for to cover every detail and arrangements have been made to carry these two products into actual construction work under the supervision of experienced and capable association employees.

The policy governing field promotion work was not changed in its essentials, except that the three main divisions are given a little more latitude in determining how much promotion work they shall do and how their division funds shall be apportioned to the various efforts decided upon. The Central division is left in exactly the same condition as before, and will proceed energetically to employ more field men in construction, agriculture, and chemistry fields to promote that work even more vigorously than in the past.

The elections and discussions of policies were carried on in executive session, open to qualified members only, but other sessions were open to anyone who might wish to attend, and the scope of the work being done by the Lime Association was a revelation to most of those who heard the reports and the technical papers.

On Thursday evening, the Valve Bag Co. of America entertained in the East Ball Room with a dinner which was all that could be desired and later at an entertainment given by the Strand Roof Garden Co. Just when the coffee was served, W. E. Carson, of the Riverton Lime Co., Riverton, Va., arose and made a most impressive presentation speech and uncovered a magnificent silver service for Charles Warner, the retiring president.

Late Developments in Quarrying for Lime Manufacture

By Oliver Bowles

Mineral Technologist, Bureau of Mines

A paper read at the fifth Annual Convention National Lime Association, New York City, June, 1923. Published by permission of the Director of Bureau of Mines.

The Bureau of Mines of the Department of the Interior in conducting an inquiry into quarry methods has issued six reports at intervals of about a month. On the last page of each report a series of questions appears, and answers to these questions by quarry operators have supplied the Bureau with additional information that, it is hoped, will be instructive and helpful. No attempt has yet been made to analyze in detail all the information received, but certain general features are outstanding and worthy of comment at this time.

In the first place there is a great difference of opinion regarding the use of the churn drill for primary blasting on high benches. Its advantages are generally recognized, but many operators object to its use partly because it makes selection of rock from different beds difficult, and partly because churn drill blasts throw down rock in masses that are too great in size for convenience in hand loading. The power shovel is likewise condemned by many as an undesirable loading device. Thus even for large quarries where the churn drill and the power shovel are generally recognized as efficient types of modern equipment, most lime plant operators do not look upon them with favor. What are the real objections to their employment? Apparently objections are based on the inability of mechanical equipment to sort materials, and the peculiar conditions of the lime industry that seem to demand hand loading and hand selection of stone. It is a matter of first importance to an investigator to consider the following question. Is there not some way of overcoming the difficulties so that the cheaper and more efficient types of equipment may be used?

The independent investigator who follows lines of inquiry in many industries has this advantage that he may observe methods of operation where different types of materials are handled and is thus enabled to apply to one industry the methods or machines that hav been found advantageous in others. There is a type or equipment in common use in many mining industries that is not, insofar as I know, used in connection with any lime plant, and which would, I believe, overcome the difficulties confronted in the use of mechanical loading devices. The equipment to which I refer is the picking belt which consists of an ordinary belt conveyor beside which men are stationed to pick out inferior rock fragments as the loaded belt slowly passes by. Materials thus removed may be thrown down a chute into a bin or car for subsequent removal. The great advantage is that nearly all of the heavy, slow and costly work of hand loading is eliminated while the element of personal selection remains. It is important to emphasize that hand selection by this method is probably much more efficient than is ordinarily accomplished by hand loading methods. Comments by operators on the paper issued by the Bureau on loading methods emphasized a point probably many of you have observed, namely, that the hand loader is not always a careful chooser, that his interest is chiefly in tonnage, because most hand loading is done on a contract basis, and unless constantly supervised the great advantage of personal selection so often claimed for hand loading may be largely nullified through carelessness. Where the picking belt is employed the workman has no personal interest in the tonnage of rock carried on the belt, for his sole duty is the removal of undesirable rock fragments, and efficiency in such work is the only justification for his employment. Therefore, real service may be expected, and it may be worth while to note that men in such positions develop a skill in selection that is really remarkable. I am convinced that the picking belt used in connection with churn drill blasting and power shovel loading offers possibilities of great advantage to the lime industry and I would be glad to see this equipment tried out at quarries where the rock is so variable that hand selection seems to be imperative.

Another point that may be emphasized is the growing tendency toward underground operation. It is generally conceded that blasting limestone in drifts and tunnels results in the production of a greater proportion of spalls than results from open pit blasting. Thus the problem of utilizing fine materials is brought into greater prominence. Further emphasis is placed on this problem by the fact that increased use of rock crushers results in a greater proportion of fines, for the skillful hand sledger can break up rock with a lower proportion of waste than results from any mechanical crusher. One operator who has kept accurate records states that with hand sledging 70 to 80% of the stone was of kiln size and when a rock crusher was used on the same stone only 55% was of kiln size. These proportions will vary depending on the nature of the rock, but it may be accepted as a fact that an increased proportion of spalls will result where rock crushers are substituted for hand sledging.

Thus as one looks into the future there are in prospect two tendencies, one toward underground operation, the other toward a wider use of mechanical breakers, and both these tendencies involve an increased proportion of materials under 4 in. in size. Thus the lime industry is confronted with a problem of very great importance, that of utilizing profitably the thousands of tons of material that is generally regarded as poorly adapted for burning into lime in shaft kilns; and the feature that is of special interest at this time is the prospect of an increasing proportion of such undesirable materials. It is evident, therefore, that the lime industry must face this issue and must by research and experimental work devise means of utilizing these materials either for lime manufacture or by-products.

You have probably learned that the Bureau of Mines is about to establish a new experiment station in connection with Rutgers College at New Brunswick, New Jersey, which will be devoted to problems in the non-metallic industries. As superintendent of that station, it is my purpose to make utilization of waste limestone one of the first problems to be undertaken. The nature of the problem is such that only a limited amount of research can be conducted in a laboratory, the really important and constructive work must be conducted largely at the lime plants themselves under operating conditions. It is hoped that by observation and experimentation important results may be obtained and the success of such work will depend in a large measure on the spirit of cooperation and team-work that can be developed between the lime industry and the Bureau of Mines. In response to the paper issued by the Bureau on utilization of waste limestone quite a number of replies have been received expressing a desire to cooperate cordially with the Bureau in working out these problems. These are hopeful signs and it is my purpose to take you at your word and seek your cooperation and assistance.

Market for American Cement in Cuba

Importation of cement from the United States into Cuba in 1922 showed a decrease of 65% in quantity and of 53% in value as compared with 1920, according to Ben B. Sampselle, clerk in American consulate general, Habana, in *The Cuba Review*. A large percentage of this decrease was no doubt due to the suspension of practically all construction work during the financial depression through which Cuba has just passed, the total consumption of cement in the island having decreased 47% during this period. Shipments of cement from the United States to Cuba during the past four years have been: 1922—443,391 bbls.; 1921—447,706 bbls.; 1920—1,275,169 bbls.; 1919—1,061,786 bbls. In 1920 (the latest year for which figures of imports from all countries are available) the remainder of the imports of cement into Cuba came mostly from Canada (40,507 barrels), with the Netherlands, France, Belgium, and other countries making small contributions.

A higher rate of duty levied on imports from countries other than the United States and slightly higher ocean freight rates have served to offset any price advantage that European exporters might have had through cheapness of labor. While several European countries have previously enjoyed a share in the cement trade, the greatest competition of the present and future is furnished by local manufacturers. The domestic product, which is manufactured by the "wet" process, and is equal in quality to that imported, amounted to 500,000 bbls. in 1922, 435,000 bbls. in 1921, 460,000 bbls. in 1920, and 310,000 bbls. in 1919. An advantage is had by American exporters over the local manufacturers in that the combined steamship and railroad freight charges on cement exported from New York destined for the central or eastern interior of Cuba are from 10 to 20% less than the railroad freight charges from Habana, notwithstanding the local producer is allowed a small preferential rate by the local railways.

An extensive advertising campaign is now being carried on by a local factory, no doubt in view of the fact that the economic situation has improved considerably in the past six months and that a large amount of construction work will take place this year. It has been unofficially stated that work will be resumed in the near future on a number of government projects which were suspended during the financial depression. In this event the consumption of cement for 1923 would be greatly increased.

Bauxite, a Constituent of Alcement

After Raymond B. Ladoo in *Mines, Carriers, Grandes Enterprises,* and *Engineering and Mining Journal-Press*

High-Alumina cements which are essentially calcium aluminates with low silica are becoming of great importance. They have been made by fusing, in a small blast furnace a mixture of bauxite, coke and limestone. The slag, when poured, cooled and ground, forms the finished cement. This cement contains about 50% lime, 40% alumina and 10% silica, and is known as fused cement, Lafarge cement, or, in Europe, ciment fondu and alcement.

The principal advantage of such cements over ordinary portland cement, is that they harden much faster and develop nearly their full strength in a short time. It is stated that such cements will show a strength at the end of 24 hours rarely shown by portland cements in less than 28 days.

During the Great War, alcement was manufactured in France in large quantities for use in making heavy gun emplacements and other structures where great strength was needed in short time. Alcement has the additional advantage of being highly resistant to sea water and similar solutions.

James M. Hill states that bauxite is a rock composed of at least two and possibly three hydrates of alumina, iron oxide, water, silica, and more or less titanium oxide and clay. The three hydrates commonly found are $Al_2O_3.H_2O$ (formula for diaspore), $Al_2O_3.2H_2O$ (theoretical bauxite) and $Al_2O_3.3H_2O$ (formula for gibbsite). Theoretical bauxite contains 73.9% alumina (39.2% aluminum) and 26.1% water. The percentage of alumina in commercial ore now usually ranges from 50 to 60, which corresponds to 26.5% to 31.8% metallic aluminum.

Bauxite is an earthy mineral, never crystallized, occurring in a variety of forms and colors. It often possesses a pisolitic or oölitic structure with rounded concretionary grains imbedded in an amophorus or claylike mass. The pisolites vary in size from a small fraction of an inch to as much as 2 in., but usually average from ¼ to ¾ in. It also occurs as a hard or soft structureless amorphous mass.

The following physical properties help to identify the mineral: Hardness, 1 to 3; specific gravity, 2.55; melting point, on heating changes to Al_2O_3, which, when pure, melts at 1,880° to 2,050° C.; index of refraction, 1.57; color, white, cream, yellow, brown, gray or red. streak, variable, luster, dull to earthy; cleavage, irregular fracture; transparency, opaque; tenacity, crumbly.

Analyses of bauxite from various localities:

	Baux, France	Baux, France	Hesse Germany	Arkansas	Arkansas	Alabama	British Guiana
Al_2O_3	60.0	75.0	55.61	52.0	53.0	61.0	59.56
Fe_2O_3	25.0	12.0	7.17	4.0	10.0	2.20	2.49
SiO_2	3.0	1.0	4.41	10.0	4.0	2.10	2.65
TiO_2				4.0	4.0	3.12	3.80
H_2O	12.0	12.0	32.33	30.0	29.0	31.58	31.50

World production of bauxite in long tons:

The statistics of world production of bauxite are not complete for recent years, and are therefore rather difficult of interpretation. This is due to the fact that production statistics for several countries are not available for the war period and that the ownership of several important deposits was changed by the peace treaty.

	1913	1917	1919	1920
United States	210,241	568,690	376,566	521,308
France	304,323	118,973	160,820	186,693
Dalmatia and Istria		160,501		
Italy	6,840	7,664	2,924	37,360
British Guiana		2,037	1,967	29,399
United Kingdom	6,055	14,724	9,221	
India	1,184	1,363	1,682	
Spain			1,751	

The following table, compiled by the U. S. Geological Survey, gives the United States production and consumption of bauxite in 1914, 1918, 1919 and 1920, the difference showing imports or exports:

Domestic production and consumption of bauxite in long tons:

	Production		Consumption	
	Quantity	Value	Quantity	Value
1914	219,318	$1,069,194	238.788	$ 925,610
1918	605,721	3,447,992	589,663	1,939,095
1919	376,566	2,201,747	364,947	886,473
1920	521,308	3,247,345	541,946	1,655,033

In recent years there have been few bauxite producers who were not also consumers. At present the market for bauxite is practically confined to the states east of Mississippi. The manufacture of aluminum (controlled practically by the Aluminum Co. of America) consumes more than 70% of the bauxite used in the United States. The market for bauxite for non-metallic uses (chemicals, abrasives and refractories) are increasing in number with the increase in the use of aluminum sulfate for water purification.

UNITED STATES IS THE PRINCIPAL SOURCE OF BAUXITE

Arkansas in 1920 furnished over 90% of the domestic bauxite production. The principal areas worked are in Saline and Pulaski counties, and the chief center of production is Bauxite, Saline county.—Fig. 1 illustrates mining bauxite with steam shovels at Bauxite, Ark. (From *Engineering and Mining Journal-Press*). At this mine, the property of the American Bauxite Co., a subsidiary of the Aluminum Co. of America, the ore occurs as a gently dipping bed averaging about 11 ft. thick, derived by alteration from syenite under an overburden of sand and clay varying from 25 ft. to a maximum of 140 ft.

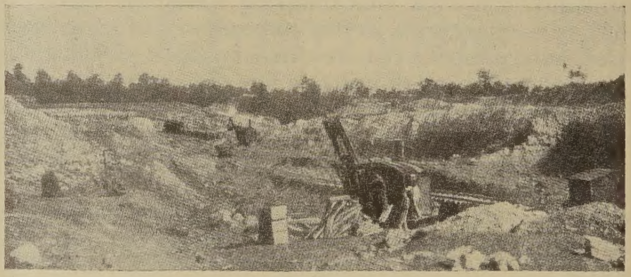


FIG. 1—MINING BAUXITE WITH STEAM SHOVELS AT BAUXITE, ARK.
Courtesy, *Engineering and Mining Journal-Press.*

Georgia, second in importance of production, contains deposits in many counties. The counties producing in 1920, in order of production, were Sumter, Wilkinson, Floyd, Randolph, Merywether, Macon and Bartow. The largest producer was the Republic mine, east of Andersonville, in Sumter county.

In Alabama, deposits occur near Rock Run and Piedmont, Cherokee county; Fort Payne, De Kalb county, Talladega county; and also in Calhoun county.

In Tennessee, bauxite is found in Hamilton and Carter Counties near Chattanooga, Keensburg and Elizabethton.

SOUTH AMERICAN DEPOSITS MAY PROVE IMPORTANT

The bauxites of British Guiana are extensive and of good quality. The deposits occur in the foot hills on the Demarara river, about 60 miles above Georgetown, and extend across the country and probably through Dutch Guiana. Large deposits, in British Guiana are owned and being developed by an American company, but future concessions are reserved for British subjects. It is believed that the Guianas will become an important factor in the world bauxite industry of the future.

Modern Mining and Calcining Methods

The bauxites found in the United States ordinarily contain from 15% to 33% of combined water, together with a varying amount of mechanically held moisture. As most of the bauxite ore must be shipped a considerable distance, it is customary for the larger producers to dry the ore before shipment, so as to save freight and facilitate fine grinding for later use.

In Arkansas, the American Bauxite Co. dumps the ore from the mine cars into large bins, from the bottom of which it is removed by pan feeders. Hard rock is fed to large gyratory crushers, and the soft ore to disintegrators of a special type. From the crushers horizontal and inclined belt conveyors collect the ore, elevate it, and distribute it over large storage bins. From the bins, the ore is fed by gravity directly to a battery of ten rotary kilns. The kilns are 50 ft. long and most of them are cylindrical, 7 ft. in diameter, and are fired by pulverized coal to a temperature about 1.100° F., and the mechanical moisture is reduced to from ½ of 1% to 1%. From the kilns the material drops into a long pan-conveyor, where it cools to some extent, and is then elevated into large bins. For shipment the ore is drawn off through chutes into covered hopper bottom, standard gauge cars of a special type. For abrasives and refractories some of the ore is dead burned at a heat of about 2,000° F. and the total moisture reduced to about ½%.

Quotation for Foreign and Domestic Output

In December, 1921, the following prices were quoted by the *Engineering and Mining Journal:*

French bauxite, $8.00 to $10.00 per metric ton, c.i.f. Atlantic ports. American bauxite, crushed and dried, $8.00 to $10.00 per gross ton, f.o.b. shipping point; pulverized and dried, $12.00 to $15.00 per gross ton, depending upon grade; calcined so as to remove most of combined water, $20.00 per gross ton f.o.b. shipping point.

Scientific Quarry Blasting

Record Systems

By J. Barab

Hercules Powder Co.

Part III of a paper delivered at the Sixth Annual Convention of the National Crushed Stone Association, Chicago, Ill., Jan. 16, 1923. For Parts I and II see Cement Mill Edition of Concrete for April and May, 1923.

Many quarries have adopted record systems. The ideal record is one that will give all the information needed with the least effort. After studying a number of the forms in use, we have prepared several types which should assist in analyzing blasting costs and in keeping them at a minimum. Some variations in the forms may be necessary to fit local conditions, but we believe these are good types to follow.

Open-Pit Mine in Arizona
Detailed Cost of Drilling and Blasting 36 Tripod Drill Holes
2nd Cut Hill No. 1
Ore Broken, 32,700 Tons; 6.17 Tons Per lb. Explosives

Item		Quantity	Price	Cost	Cost per ton
Labor	Drilling			$376.40	$.0115
	Springing & Loading			157.28	.0048
Supplies	Drilling			188.20	.0058
Explosives	Springing	1162 lbs.	$.1910	221.94	.0068
	Loading	307 lbs.	.1960	60.17	
		4973 lbs.	.1910	949.84	.0309
Exploders & Blasting Wire				36.30	.0011
Total				1990.13	.0609

Cost Data at a Western Operation

COST	Labor	Material	Other Expenses	Total
Drilling	$6343.35	$5234.32	$1119.81	$12697.48
Loading & refilling	2466.24	51.59	415.59	2935.42
Explosives		13392.80		13392.80
Total	8811.59	18678.71	1535.40	29025.70

UNIT COSTS

1449 Feet	Per linear foot penetration			
Drilling	$4.378	$3.612	$.773	$8.763
Loading & refilling	1.703	.036	.287	2.026
Total	6.081	3.648	1.060	10.789

250,000 cu. yds.	Per cubic yard of rock			
Drilling	.0254	$.0209	$.0045	$.0508
Loading & refilling	.0098	.0002	.0017	.0117
Explosives		.0536		.0536
Total	.0352	.0747	.0062	.1161

One large blast consisted of shooting the face of a hill 1000 feet long with an average height of about 70 ft. The explosives were loaded in tunnels drilled at 60 ft. intervals at right angles to the face. Eleven tunnels were driven 3 ft. x ft. 4 in cross section and 60 ft. in length, with a 40 ft. T at the end, each T containing two circular pockets 5 ft. x ft. 5 sunk slightly below the floor level. The drilling was done by air-driven jack hammers.

The labor turnover was extremely high and during the very hot weather was approximately 100% per day. This of course made all labor items rather high.

Black blasting powder was the principal blasting charge. Three No. 7 Electric Blasting Caps and 150 lbs. 40% dynamite were used as a primer for each pocket. The detonators were connected in parallel and fired from a 440 volt circuit.

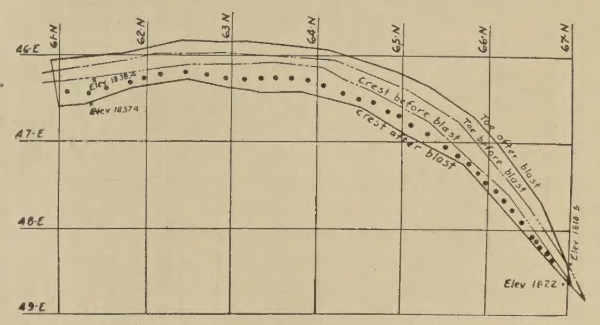


Diagram Showing Conditions Before and After Blast

I have briefly covered the theory of explosions, touched upon the more important recent advances in blasting practice, described a number of special blasting methods which have solved unusual problems, and outlined methods of making measurements and calculations and of keeping records. Experience has proved that this information is of practical value. Present conditions demand from those in charge of quarry work a scientific application of just such knowledge as this. If any member of this association wishes to discuss other blasting problems I shall be glad to hear from him either at this meeting or through correspondence.

Useful Tables

The following general data and tables may be helpful in your work:

Good Proportions for Medium Hard Rock for Pocket Loading

Height of Bank	Depth of Hole	Max Toe.
20	22	16
25	28	20
30	33	20-25
35	39	20-30
40	45	25-32
45	50	25-35
50	55	30-40
60	66	35-45
75	82	45
90	98	45
100	108	45-50

Where the back-break is unusually large you can look with suspicion on the success of the blast for very likely a hard toe has been left.

Depth of Well-Drill Holes with Column Loading for Various Heights of Bank, where Natural Parting Planes are not Present at Floot Level

Depth of Holes

Height of Bank	Depth of Hole	Height of Bank	Depth of Hole
15	17	50	55
20	22	55	60
25	28	60	65
30	33	65	70
35	38	80	86
40	44	90	96
45	49	100	106
		120	127

DETAILED LOADING SHEET USED AT OPEN-PIT MINE IN ARIZONA

Hole No.	Ht. of Bank	Depth Hole	Bottom		Deck Loading				Stemming Ft.	Total Lbs. Explosives
			Lbs.	Depth	Lbs.	Depth	Lbs.	Depth		
1										
2										
3										
4										
5										
20										

NUMBER CUBIC YARDS OF MATERIAL IN THE SOLID DISPLACED PER FOOT OF HOLE AT DIFFERENT SPACINGS FOR VERTICAL FACES
DISTANCE HOLES ARE SPACED APART IN FEET

Distance Holes Are Set Back from Face in Feet	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
7	1.81	2.0	2.33	2.7	2.85	3.11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	2.0	2.37	2.65	2.96	3.26	3.55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	2.33	2.65	3.0	3.33	3.66	4.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
10	2.7	2.96	3.33	3.7	4.1	4.44	4.81	5.18	5.55	5.92	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
11	.....	3.26	3.66	4.1	4.48	4.88	5.3	5.7	6.11	6.52	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
12	.....	.....	4.0	4.44	4.88	5.33	5.77	6.22	6.66	7.11	7.55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
13	.....	.....	.....	4.81	5.8	5.77	6.26	6.74	7.22	7.70	8.18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
14	.....	.....	.....	5.18	5.7	6.22	6.74	7.26	7.77	8.30	8.81	9.33	9.85	10.77	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
15	.....	.....	.....	5.55	6.11	6.66	7.22	7.77	8.33	8.88	9.44	10.0	10.55	11.11	11.66	12.22	12.78	13.33	13.88	14.44	15.0	15.55	16.1	16.66
16	.....	.....	.....	.....	.....	7.11	7.70	8.30	8.88	9.48	10.07	10.66	11.3	11.85	12.44	13.03	13.63	14.22	14.81	15.74	16.45	16.60	17.18	17.77
17	.....	.....	.....	.....	.....	7.55	8.18	8.81	9.44	10.07	10.70	11.33	11.96	12.59	13.22	13.85	14.48	15.11	15.74	16.37	17.0	17.63	18.26	18.88
18	.....	.....	.....	.....	.....	8.0	8.66	9.33	10.0	10.66	11.33	12.0	12.66	13.33	14.37	14.66	15.33	16.0	16.66	17.33	18.0	18.52	19.33	20.0
19	.....	.....	.....	.....	.....	.....	9.15	9.85	10.55	11.3	11.96	12.66	18.37	14.07	14.77	15.43	16.18	16.88	17.60	18.83	19.0	19.70	20.40	21.11
20	.....	.....	.....	.....	.....	.....	9.63	10.37	11.11	11.85	12.59	13.33	14.07	14.81	15.55	16.30	17.03	17.77	18.51	19.26	20.0	20.74	21.48	22.22
21	.....	.....	.....	.....	.....	.....	.....	.....	11.66	12.44	13.22	14.37	14.77	15.55	16.33	17.11	17.88	18.66	19.44	20.22	21.0	21.77	22.55	23.33
22	.....	.....	.....	.....	.....	.....	.....	.....	12.22	13.03	13.85	14.66	15.48	16.30	17.11	17.92	18.74	19.55	20.4	21.18	22.0	22.83	23.63	24.44
23	.....	.....	.....	.....	.....	.....	.....	.....	12.78	13.63	14.48	15.33	16.18	17.03	17.88	18.74	19.59	20.44	21.39	22.14	23.0	23.85	24.7	25.55
24	.....	.....	.....	.....	.....	.....	.....	.....	13.33	14.22	15.11	16.0	16.88	17.77	18.66	19.55	20.44	21.33	22.22	23.11	24.0	24.88	25.77	26.66
25	.....	.....	.....	.....	.....	.....	.....	.....	13.88	14.81	15.74	16.66	17.60	18.51	19.44	20.4	21.39	22.22	23.14	24.07	25.0	25.92	26.88	27.77
26	.....	.....	.....	.....	.....	.....	.....	.....	14.44	15.74	16.37	17.33	18.30	19.26	20.22	21.18	22.14	23.11	24.07	24.66	26.0	26.96	27.92	28.88
27	.....	.....	.....	.....	.....	.....	.....	.....	15.0	16.00	17.0	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0
28	.....	.....	.....	.....	.....	.....	.....	.....	15.55	16.60	17.63	18.52	19.70	20.74	21.77	22.83	23.85	24.88	25.92	26.96	28.0	29.03	30.81	31.11
29	.....	.....	.....	.....	.....	.....	.....	.....	16.1	17.18	18.26	19.33	20.40	21.48	22.55	23.63	24.7	25.77	26.88	27.92	29.0	30.07	31.14	32.22
30	.....	.....	.....	.....	.....	.....	.....	.....	16.66	17.77	18.88	20.0	21.11	22.22	23.33	24.44	25.55	26.66	27.77	28.88	30.0	31.11	32.22	33.33
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	23.74	25.26	26.4	27.55	28.7	29.85	31.0	32.14	33.29	34.44
32	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	24.88	26.74	27.59	28.44	29.63	30.81	32.0	33.18	34.37	35.55
33	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	28.26	29.33	30.55	31.77	33.0	34.22	35.44	36.66
34	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	31.48	32.74	34.0	35.25	36.51	37.77
35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	32.4	33.7	35.0	36.29	37.59	38.88

To Convert to Tons	
	For Limestone, multiply by 2.27
	For Trap Rock, multiply by 2.52
	For Granite, multiply by 2.3
	For Shale, multiply by 2.13
	For Sandstone, multiply by 1.55

SUGGESTED SPACING OF WELL-DRILL HOLES ON FACES OF DIFFERENT HEIGHTS IN VARIOUS KINDS OF MATERIAL

Kind of Material		Granite Gneiss Quartzite	Hard Solid and Thickly Bedded Limestone and Dolomite	Medium Thickly Stratafied Limestone	Thinly Laminated Limestone	Sandstone	Shale Medium Hard to Soft
CLASS OF EXPLOSIVE For Average Conditions		I	II	III	IV	V	VI
Spacing in Feet for Given Depth of Cut Feet	15	7x8	8x9	9x10	10x12	9x10	10x12
	20	9x11	10x12	10x12	12x14	10x12	12x15
	25	10x12	10x12	12x14	12x14	12x14	15x18
	30	12x14	12x15	12x15	12x16	13x15	15x18
	35	12x14	12x15	14x16	12x16	14x17	16x18
	40	12x14	12x16	14x18	14x18	14x18	17x21
	45	13x15	12x16	14x19	14x20	15x18	18x22
	50	14x15	14x17	14x20	14x20	15x20	19x24
	55	14x16	14x18	15x21	15x22	16x20	19x24
	60	14x16	15x20	15x22	16x25	16x22	20x26
	70	15x18	16x20	16x23	16x26	20x24	22x27
	80	16x20	18x22	16x25	18x28	18x25	20x28
	90	16x21	18x22	18x26	18x29	18x25	20x29
	100	16x22	18x24	20x28	20x30	20x30	20x30
	120	16x25	20x25	20x29	20x30	20x30	20x32

Class I. 60% Gelatin Dynamite. If very wet or extremely hard rock. 60% Straight L. F. N. G. Dynamite.
60% Extra L. F. or Ammonia Dynmaite.
Class II. 60% Grade as in Class I in bottom of hole, and Special No. 1 in remainder of hole.
Class III. 40%—60% Dynamite in bottom and Special No. 1 on top.
Class IV. If work is fairly dry—Special No. 1.
If work is wet or a heavy toe is present, 40% should be used in bottom—remainder Special No. 1.
Class V. If dry, Special No. 1. Sandstone, however, varies so greatly in character and conditions that even a 60% Gelatin may at times be used to advantage.
Class VI. Special No. 2, unless extremely wet work is encountered when Gelatin or other water resistant powder should be used in bottom of hole.
Trap rock is usually given under the first column, but we have found that trap rock formations vary greatly.

Cement Will Solve Many Asiatic Problems

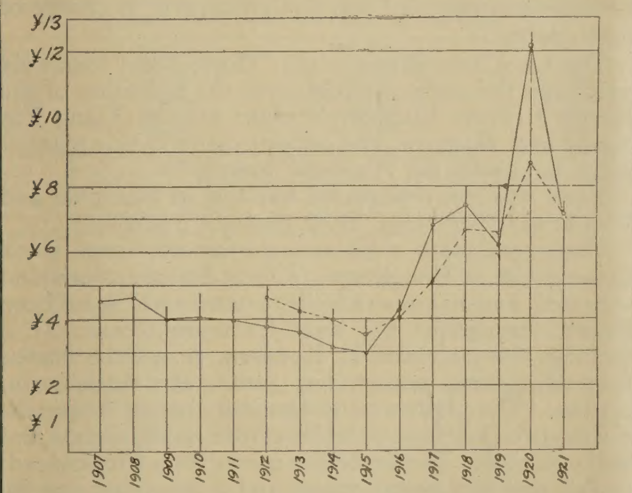
By Paul C. Van Zandt

Japan has 21 operating cement companies, which have a productive capacity of 500 bbls. or more, daily. Three of these have a capacity in excess of 1,000 bbls. daily. The Onoda Cement Company, which is the oldest concern in Japan, now has three modern, well equipped factories strategically located in Onoda (Japan), Korea and Manchuria. Their total capacity of about 5,000 bbls. daily has been included in the writer's statistics under Japan.

The new Hokoku Cement Co. has a capacity, when running full, of 2,000 bbls. daily. This plant, the Onoda and the large Asano plants are all equipped or equipping with waste-heat boilers, which will result in conserving the coal resources of Japan, which are not very great.

The Iwaki, Aichi, Oita, Tosa, Kidzugawa, and Osaka Yogyo plants are all rated as 1,000 bbls. plants of modern construction. One or two new plants are now building or being promoted.

It will be noted that the productive capacity is somewhat greater than the recorded yearly production, which is due to new equipment being added during the year and to the impossibility of operating all plants to 100% capacity throughout the entire year. Japan's production has increased from year to year in a quite normal manner, doubling during the war and promising an increase of perhaps 10% yearly for some time to come.



Price Fluctuations of Japanese Cement. Dotted Line Shows Export Price. Solid Line Shows Domestic Price

The exports amount to roughly 10% of the production while 90% is consumed locally. These exports should continue in equal or increasing amounts as the demand in other countries increases beyond their capacity to produce, due to the ability of the Japanese to manufacture an excellent cement in large quantities at a reasonable price. The tables of exports show the flexibility of the Japanese export trade, flowing here and there as the demand grew and retrenching where the demand decreased without greatly changing the total trade.

Japan does not import cement from other countries. The comparison of domestic and export prices from year to year shows very clearly how when the Japanese exports were first made, the foreign price was higher than the domestic in an amount sufficient to attract manufacturer and the exports jumped from one to 17% or actually more than 13 times in the first four years. On the rising market of the war times the export price was sluggish, but since the year 1920 the export and domestic prices have remained practically the same. At the time of writing the market seems to indicate a stiffening of both.

The cement consumed locally in Japan is used almost entirely by Japanese with Japanese capital. The small individual user predominates, while the Government railways are the largest single customer. Cement in Japan is found in every part of the country, especially on the South and East coasts. It is used for foundations of small houses, floors and steps. Likewise cement is found in the small bridges, culverts and ditches in increasing amounts. Even temples and torii are made of it, while schools and office buildings are being built of concrete in larger numbers every year. Large dams, etc. are always built of concrete now. In fact the most interesting and encouraging thing is the wide general use for this material. What Japan needs most at present is fireproof small houses in the big congested cities, and concrete roads. This is the business of the future in Japan as neither of these great needs are being provided for as yet.

List of Cement Companies in the Japanese Empire

Name	Location	Capitalization	Monthly Capacity
Asano Cement Co.	Tokyo Moji Kawasaki Hokkaido Formosa	Y33,000,000.00	510,000 bbls.
Onoda Cement Co.	Onoda Korea Manchuria	7,500,000.00	150,000 "
Kokoku Cement Co.	Karita	5,000,000.00	75,000 "
Miye Cement Co.	Yamada	4,000,000.00	15,000 "
Iwaki Cement Co.	Yotsukura	3,000,000.00	30,000 "
Aichi Cement Co.	Nagoya	3,000,000.00	30,000 "
Oita Cement Co.	Oita	3,000,000.00	25,000 "
Nippon Cement Co.	Yatsushiro	2,500,000.00	50,000 "
Tosa Cement Co.	Kochi	2,000,000.00	30,000 "
Nagoya Cement Co.	Nagoya	2,000,000.00	20,000 "
Toa Cement Co.	Amagasaki	1,500,000.00	18,000 "
Kidzugawa Cement	Osaka	1,400,000.00	25,000 "
Chuo Cement Co.	Kurosaki	1,000,000.00	20,000 "
Asahi Cement Co.	Wakayama	1,000,000.00	15,000 "
Teikoku Cement Co.	Kumamoto	1,000,000.00	(Building)
Saga Cement Co.	Saga	800,000.00	20,000 bbls.
Osaka Yogyo	Osaka	4,000,000.00	30,000 "
Sakura Cement Co.	Oita	800,000.00	20,000 "
Hinode Cement Co.	Aomori		15,000 "
Suzuki Cement Co.	Tokyo		15,000 "
Nippon Chisso Co.	Mizumata Kagamimachi		25,000 "
Denki Kagaku Kogyo	Omuta		15,000 "
Mikawa Cement Co.	Taharamachi	500,000.00	5,500 "
Yoshikawa Cement	Okayama	200,000.00	2,000 "

The Osaka Yogyo Kabushiki Kaisha manufactures brick and tile as well as cement. This is one of the largest common brick manufacturers in the East.

Exports of Cement from Japan to Other Oriental Countries

Year	North China		Kwantung		British India		Straits Settlements		Dutch East Indies		Philippines		Total Exports		Domestic Price
	Bbls.	Price Yen	Bbls.	Price Yen	Bbls.	Price Yen	Bbls.	Price Yen	Bbls.	Price Yen	Bbls.	Price Yen	Bbls.	Average Price Yen	Average Yen
1917	35,950	5.12	62,700	5.47	83,400	5.16	44,700	5.26	263,000	4.85	23,850	5.24	525,000	5.09	6.80
1918	36,000	6.30	185,500	6.60	110,000	7.09	106,200	6.50	385,000	6.59	82,700	6.34	902,000	6.66	7.40
1919	65,500	6.33	414,000	6.55	92,700	6.52	47,000	6.51	243,500	6.63	131,000	6.19	1,000,000	6 54	6.19
1920	79,750	8.96	161,600	7.52	1,348	8.75	63,700	8.97	426,800	9.38	388,000	8.38	1,153,000	8.66	12.17
1921	175,000	6.64	179,000	7.39	122,100	7.44	14,280	7.22	312,000	7.01	159,500	6.68	995,000	7 11	7.00

Fig. 1 — Unloading Coal at a Japanese Cement Plant
This primitive method of handling materials is an inheritance from former days and is rapidly disappearing in modern industries.

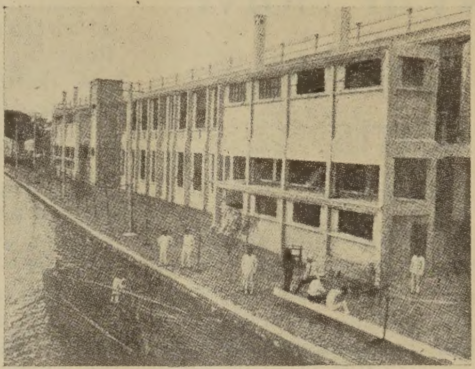


Fig. 2, (Right)—The Grand Canal of China
This modern reinforced concrete factory building was built by Chinese business men with Chinese capital and indicates the future probabilities.

The Denki Kagaku Kogyo K. K. and the Nippon Chisso K. K. both make cement from calcium carbonate by-product from the manufacture of ammonia and fertilizer by the calcium cyanimide process, and their principal business is manufacturing fertilizer.

There are a few cement companies smaller than any of the above which are not listed.

The raw materials used in making cement are limestone and clay, which are found in inexhaustible quantities almost all over the world. Japan has limestone and clay enough to last for thousands of years. Fuel is the only scarce material.

Japanese Cement Production and Export for Fifteen Years

					Exports in Percentage	
Year	Production	Price	Exports	Price	Production	Price
1907	1,747,534	Y 4.53				
1908	1,794,695	4.61				
1909	2,331,361	3.98				
1910	2,638,709	4.00				
1911	3,125,148	3.96				
1912	3,821,279	3.76	51,000	Y4.66	1.34%	124%
1913	4,562,237	3.59	156,000	4.21	3,42%	117%
1914	4,415,476	3.11	261,000	3.96	5.92%	127½%
1915	4,096,456	2.95	699,000	3.52	17.10%	119%
1916	4,772,539	4.19	675,000	4.03	14.15%	96%
1917	4,654,543	6.80	525,000	5.09	11.27%	75%
1918	6,165,566	7.40	902,000	6.66	14.63%	90%
1919	6,500,000	6.19	1,000,000	6.54	15.37%	105½%
1920	9,300,000	12.17	1,153,000	8.66	12.40%	71¼%
1921	10,000,000	7.00	995,000	7.11	9.95%	101½%

List of Oriental Cement Companies
(Other than Japanese)

Name	Location	Monthly Capacity	
	China		
Chee Tsin Cement Co.	Tangshan	80,000 bbls.	
“ “ “ “	Hupeh	15,000 “	
Green Island Cement Co.	Kowloon, Hongkong	60,000 “	
Kwantung Cement Plant	Canton	17,000 “	
Indo-China Cement Co.	Haiphong	60,000 “	
	India		
Dwarka Cement Co.	Dwarka	50,000 “	
Katni Cement Co.	Katni	16,000 “	
Bundi Cement Co.	Lakheri	13,000 “	
Indian Cement Co.	Porbander	10,000 “	
Madras Cement Co.	Madras	5,000 “	
	Miscellaneous		
Singapore Cement Co.	But Cape, Singapore	15,000 “	
Padang Cement Co.	Padang, Sumatra	20,000 “	
Bangkok Cement Co.	Bangkok, Siam	13,000 “	
Rizal Cement Co.	Manila, Philippines	12,000 “	(stopped)
	New Plants Building or in Process of Promotion		
Shanghai Cement Co.	Shanghai, China	12,000 “	Building
Wusih Cement Co.	Wusih, China	10,000 “	“
Cebu Cement Co.	Cebu, Philippines	20,000 “	“
Gwaloir Cement Co.	Gwaloir, India	25,000 “	“
Central Provinces Co.	Jubblepore, India	50,000 “	“
Rhotas Cement Co.	Bihar State, India		
Jubblepore Cement Co.	Jubblepore, India		

The Korean and Manchurian factories of the Onoda Cement Co. are listed under Japan, although Manchuria is a part of China.

There is a small plant at Tsing Tao, Shantung, China which was built by the Germans during their occupation.

The writer does not guarantee extreme accuracy in the capacities given.

At last reports several new plants were under promotion in India.

CEMENT MANUFACTURE IN CHINA

There are four producing cement companies in China. The Onoda Cement Co. has a factory at Dairen (Dalny) in the Japanese leased territory in Manchuria. This has already been mentioned. There is also a small cement plant at Tsingtao, now under Japanese control, which was originally built by the Germans when they were at Kiaochou, and which has a small capacity by the old shaft kiln process. The writer is not aware that this plant is being operated at present.

The largest plant is that of the Chee Tsin Cement Co., at Tangshan, between Tientsin and Shanghaikwan on the railway to Mukden. This is a double plant, half wet process and half dry process, very modern and equipped principally with Danish cement machinery. The Chee Tsin Cement Co. enjoys a monopolistic concession from the late Ching dynasty for the manufacture of cement in certain provinces of China and there is no operating cement company in all China north of Canton except the Chee Tsin and the two in leased territory mentioned above. The Tangshan plant has a capacity of about 3,000 bbls. daily. The raw materials are immediately adjacent to the plant which is located in the center of the coal fields. This company is therefore able to produce an excellent product at a very low cost, but the transportation facilities seem to be inadequate to allow it to distribute it to the best advantage. It is a Chinese company but has foreign experts in charge of manufacture.

The Chee Tsin brand is the "Horse," but about six years ago this company took over the operation of the Hupeh Cement Company's plant on the Yiang Tse Kiang near Hankow, and cement made in this plant is marketed under the "Pagoda" brand.

There are two new plants building at Shanghai and Wusih, near Nanking. Both plants are small.

The second plant in China is the famous Green Island Cement Co. at Hongkong. This is British owned and operated, and makes an excellent cement which has been known throughout the East for many years. It is built on the mainland at Kowloon, across the harbor from Hongkong proper, but within the British concession. The plant was modernized shortly before the war and the machinery, while a little small, is good and well operated. The limestone comes from Chinese controlled territory near Canton, and a few years ago the Chinese authorities placed an embargo on the export of this stone, much to the embarrassment of the Green Island company. This has been removed now, and the raw material is easily obtained and is of excellent grade. There was a small branch plant at Macao, which the writer understands is not now in operation.

The Chinese Government operates a small plant at Canton using the same materials as does the Green Island concern. The fact that it is under government control has resulted in rather a varied operation. It has operated under capital borrowed from the Japanese Bank of Taiwan.

The Indo-China Cement Co. at Haiphong, French Indo-China is a French concern with a good plant, now having a capacity of nearly 2,000 bbls. a day.

In the Philippines there are two cement companies, namely the Rizal and the Cebu. The former was built in 1914 by Krupp of Germany and operated for about two years. The capacity was less than 500 bbls. daily and the raw materials were lime rock and volcanic "tufa." The plant has not been in operation for the past few years.

The Cebu plant is now building with the most modern American machinery, and while it will have only about 800 or 1,000 bbls. daily capacity, it will be quite up-to-date in every respect. The great drawback to manufacture of this kind in the Philippines is the scarcity of suitable fuel. Oil is, however, now being found in abundance in Borneo and vicinity and is available for this purpose.

A modern plant was recently built at Singapore and another at Bangkok. The capacity at both places is small.

Cement Manufacture in India

India now has five or six operating plants. The largest and newest is the Dwarka on the sea coast north of Bombay. This plant is American equipped throughout, has two rotary kilns and is as modern as any plant in the world.

The three next in size are the Katni, Bundi and Indian Cement Companies respectively. All of these are comparatively old, having been in operation for some years. There are several new plants being promoted or building.

The table of imports of cement into India shows the demand which has grown since the close of the war beyond these figures. India is still a cement importing nation as are all the other countries in the Orient, excepting only Japan. China both imports and exports. This is brought about by the relative inconvenience of transportation. This is not true of India, and once India makes enough for domestic consumption she may take her place as an exporting country.

Imports of Cement into India for Five Years

Year	By Government	By Others	Total
1913-4	862,000 bbls.	170,000 bbls.	1,032,000 bbls.
1914-5	851,000 "	126,000 "	977,000 "
1915-6	774,000 "	64,000 "	838,000 "
1916-7	526,000 "	48,000 "	574,000 "
1917-8	494,000 "	10,000 "	504,000 "

The above figures show there was already a consumption of cement in India prior to the war of 1,000,000 barrels annually more than the local production, and that about 1/5th was used by other than the government. This excess of consumption will be entirely taken care of by the present building cement factories, but in turn the resulting lowering of price by domestic production will stimulate consumption and India will take her place as a great cement producing country.

There is a small cement plant on the Island of Sumatra, Dutch East Indies.

Next to Japan, India promises to become quite a cement producing country. When the contemplated plants are all producing India should make between three and four million barrels annually.

It is difficult to forecast the future, but it is apparent that the cement industry is firmly established in the Orient and has already grown to wonderful proportions in Japan. The newest plants are remarkably modern and well equipped, while the old companies which have been progressive have kept abreast of the times and operate modern plants as well. Those which were established some time ago and have not been able to remodel are of such small capacity that the writer believes that a larger percentage of cement is made in modern plants by modern methods in the Orient than is the case in Europe and as large a percentage as is the case in America. It does not follow from this remarkable fact that the operators are as skillful as those of the European and American countries. The reverse is true, of course, and a generation or two must pass before the individual skill of the Oriental worker may begin to approach that of his white brother. Oriental labor is paid less for a day's time than is paid anywhere else, and yet the writer has still to find a cement plant where the actual labor cost per barrel of cement produced is not materially higher than it is in the United States where labor is paid the highest wage.

The value of cement to the Orient is beyond belief and once its use becomes widely extended the great sum total of human suffering in Asia will be immeasurably reduced. The intelligent construction, once for all time, of the great cement structures necessary for the control of rivers, together with reforestation, will make it possible to stop floods, famines, pestilence and even revolutions and other disastrous political upheavals resulting from these things, and lack of transportation, as nearly as it is possible for human-kind to eradicate such.

The structures in which cement is used are for the most part public buildings, offices, bridges, dams and large factories at present, and in Asia the small user of cement in retail quantities has not yet been developed.

By far the greatest need for cement is in road construction. The Japanese Government and Tokyo City engineers have devoted a great deal of study on this subject, and when concrete roads are once commenced in Japan the use for cement will double and the country will be opened up for travel as it never has been heretofore. It is the writer's opinion that Japan will lead the Orient in building good wide concrete roads in the very near future, to her very great advantage.

In China and Asia proper the need of roads of any kind whatsoever is so great that it seems superfluous to say "concrete." China's great famines are caused by floods, droughts or revolution, and *lack of roads* to carry the surplus from one district to another in great need. These famines have cost China and the rest of the world as well, many times the cost of permanent works to prevent them. The people are pitifully poor as a result of too often repeated futile efforts to build from mud and wood structures that should be made once for all in steel and concrete. The writer believes that the change has already begun in China towards permanent concrete structures.

The fact that roads, bridges and permanent buildings, dams, drains and railways constitute a large part of the real wealth of a nation, available to all, and that the use of cement may be taken as a very fair measure of the advancement of a country, or at least of its material prosperity, never impressed the writer forcibly until he traveled where none of the forms of wealth were to be found. The comparison is so striking and the value of these forms of wealth to the humblest worker is so apparent that one is prone to ascribe all the troubles and poverty of a country to its lack of capital. This is undoubtedly fallacious, as nature is so lavish that all the peoples of the world can have all they need if they will only work intelligently for it. Asia is slowly, and in her own way, starting forward towards the goal of better living for all, resulting from the public accumulation of material wealth.

At the present time, however, in all Asiatic countries, excepting Japan, most of the cement used by private enterprise as well as for railways, highways, etc., is consumed in structures originated by the enterprising "foreigner" who builds as he does at home in Europe or America. This example is taken up very, very slowly by the wealthy and intelligent native and an almost inconsequential fringe of material advancement has already appeared. The cement users are still, however, the governments in their railways, bridges, etc., foreigners in their buildings, and a few private individuals who are progressive and in contact with the outside world.

The great mass of Asiatic population has yet to learn of this wonderful material which is so rapidly and successfully replacing the oldest building material known.

Cement Labels I Have Met—Part 6

By Charles W. Erdell
Bethlehem, Pa.

In presenting this (the sixth) group of miniature cement labels, representing 55 foreign cement manufacturers, we desire to state that the labels reproduced herewith are a fair representation of the remaining foreign brands that are to be shown in Concrete. As before mentioned, the colors of the various labels are the governing factor in connection with the matter of properly reproducing them, and the trade-marks in this issue have been arranged accordingly. As the supply of unpublished labels diminishes the task of reproducing them naturally becomes more complex. Nevertheless, the publishers of this magazine make every effort to so arrange matters that every possible brand will be shown in these columns. It will not be practicable, however, to show all of the foreign brands, as some of them will not readily reproduce. Proper mention shall be made of all such brands in the final article on this subject.

The 75 labels which were shown in the June issue made up what is probably the most comprehensive and interesting group of such trade-marks of the cement industry that it will ever be possible to show. So many countries and domains were represented and the various designs depicted on the labels were so different in character from the accepted form of American brands, that the reader was, no doubt, amply repaid for his perusal of these *brands from across the sea.*

The brands shown in this issue are composed of the following:

21	Belgian
21	German
5	English
1	Swedish
1	Austrian
1	Japanese

A careful study of the foreign brands will reveal the fact that many of them represent things of bygone generations. Certainly there are a number that antedate the time when cement became a general article of commerce the world over. These may date back nearly 50 years, and it would be interesting to know how many of these foreign trade-marks have passed the fifty-year mile post. As a matter of record and useful information, it would be of still greater value and interest if any of our friends from the other side would enlighten us as to the oldest brands in their respective countries.

Which are the Oldest Brands?

In connection with the foregoing, the author, therefore, invites correspondence from readers of Concrete in the various foreign countries, who may be able to shed light on this question. Upon receipt of information that will be of interest along these lines, the findings will be published in a separate article in Concrete at a later date. Should it be the case that a brand of known antiquity has not been shown here, due to some reason or other, the author would request a copy of such trade-mark, with full information concerning it.

Labels of Newly-Organized Companies

With the hope that the author will be pardoned for his presumption, an appeal is hereby sent forth to such of those companies that have organized and adopted a miniature label during the past 15 years, to forward a few copies of their miniature trade-marks, in order that they may be included in the *Collection of Miniature Cement Labels of the World.* To all of those submitting such brands, prompt and grateful acknowledgment will be made by the author.

The Labels in this Issue

Turning our attention to the miniature labels in this issue, we will be fully repaid if careful scrutiny is made of the various brands and the limited amount of descriptive matter that it is permissible to bestow on the subjects.

No. 346 is the "Pyramid" brand of Knight, Bevan & Sturge, London. This was the very first English label to find its way into my collection. For some unaccountable reason this brand has always appealed to me as being a stalwart trade-mark of the industry in that country, although there are many other English brands of just as great renown.

The next is the "Ace" brand of Alfred Cheney & Eggar, London. No. 348 depicts the age of modern achievements. It is the "Submarine" brand of waterproof super cement, a new-comer in the British cement industry.

No. 349 shows the Star and Crescent of the Hellekis works at Kinnekulle, Sweden.

No. 350 is a French label, being that of the firm of D'Allas & De Marnac, Prompt Allas.

No. 351 reveals the "Lion" brand of Booth & Co., Borstal on Medway, England.

No. 352 represents a plant in Rolsberg, Austria.

No. 353 is one of the labels of the well-known Alsen mills located in Itzehoe, Uetersen and Hamburg, Germany. This company put out several grades of cement, so far as setting time is concerned, and each grade was represented by a label of a certain color to show the time of setting. These labels are colored either blue, yellow or white. This is the same concern that once operated the Alsen Portland Cement Company's plant at Alsen on the Hudson, New York.

No. 354 is a Belgian brand, being the "Buffalo" trade-mark, and was made for N. S. Fernando Colombo.

No. 355 shows the "Crown" brand of the very well-known German concern of Portland Cement Fabrik Hemmoor, Hamburg.

No. 356 is the "Royal Crown" brand of a Belgian manufacturer.

No. 357 is the lusty herald of Charles Nelson & Co., Stockton, Rugby, England.

No. 358 shows us the "Mechanica" brand of Belgian origin, being used in exporting to San Paulo, Brazil.

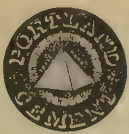
The "Lion," so universally used as a trade-mark, now makes his appearance in No. 359, a French concern.

The "Red Cross" brand next depicted is a German brand.

No. 361 represents the Germania works in Rhenania, Germany.

No. 362 shows the trade-mark of the Compagnie Parisienne des Ciments Portland, Paris.

The next three are Belgian labels, being the "Foun-



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357

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SOCIETE DES CIMENTS D'ALLAS & DE MARNAC
PROMPT ALLAS
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DARSY. LEFEBVRE: STENNE & LAVOCAT
CIMENT PORTLAND
LE LION
MARQUE DE FABRIQUE DÉPOSÉE
SIÈGE SOCIAL
A NEUFCHATEL PRÈS BOULOGNE-S-MER
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361

COMPAGNIE PARISIENNE DES CIMENTS PORTLAND ARTIFICIELS
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STE GLE DES CIMENTS PORTLAND
DE L'ESCAUT
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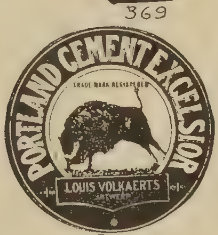

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LUDENSCHEIDER PORTLAND-CEMENT-FABRIK
L.P.C.
BRUGGE i/W.
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HÖXTERSCHE PORTLAND CEMENT FABRIK A.G.
vormals J. H. EICHWALD SÖHNE
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PORTLAND-CEMENT
TRADE MARK
AOYAMA CEMENT WORKS: SANO. TOCHIGIKEN
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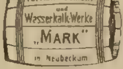
Portland Cement und Wasserkalk Werke
„MARK"
in Neubeckum
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tain," the "Lion" of Tournai, and "Labour."

No. 366 is the label of Union des Chaux et Ciments, Saint Astier, France.

No. 367 represents the "Fleur de Lis" brand of the Campagnie Ciments, Del'Escault, Belgium.

Nos. 368 and 369 are the "White Cross" and "Seal" brands of two Belgian plants.

Nos. 370 and 371 show the "Ponton" and "Sloop" trade-marks of two other Belgian manufacturers.

No. 372 is the "African Tiger" brand of Dejond Son & Co., also a Belgian concern.

No. 373 is the "Bison" brand of Louis Volkaerts, Antwerp.

No. 374 depicts the "Castle" brand of the company of Grand Fontaine, Belgium.

Samson is showing us his strength in No. 375, another Belgian brand.

Nos. 376 and 377 are the "Lion" and "Star Eagle," Belgian brands.

No. 378 is a Belgian brand, the design showing elephants in an African jungle.

No. 379 is another Belgian "Lion" brand, being that of Dufossez & Henry, of Confrestu-Morlanwelz.

No. 380 depicts the L. P. C. brand of Ludenscheider Portland Cement Fabrik, Brugge in Westphalia, Germany.

No. 381 is a French brand, being that of Quillot Freres, De Frangey.

No. 382, the label of the Hoxter'sche Portland Cement Fabrik, is a German brand. This was formerly the works of J. H. Eichwald & Sohne.

Nos. 383 and 384 are Belgian trade-marks, being the "Unicorn" and "Eagle" brands.

No. 385 is the well-known "3-Star" brand of the company located in Mannheim, Germany.

No. 386 represents a white cement manufactured by the Hemmoor company, whose other label is herein shown as No. 355.

How appropriate at this time is No. 387, with the fan from the Orient! This is the trade-mark of the Aoyama Cement Works, located at Sano, Tochigiken, Japan.

No. 388 is the "Bell" brand of the Zollhaus Portland Cement & Thonwerk, a German plant.

No. 389 is the Rudelsburg trade-mark, Bad Kosen, Germany. The concrete bridge which is here depicted is similar to that of the one used on the label of the United States Portland Cement Co., Denver, Colorado, and which was shown as Label No. 104 in the April issue of CONCRETE.

In No. 390 we have a very stout barrel of the German product, made by the Portland Cement and Wasserkalk Werke, in Neubeckum.

No. 391 is the "Phonix" (same as Phoenix) brand of a German manufacturer.

In No. 392 we have the very well-known label of the firm of Dyckerhoff & Son, Amoneburg bei Biebrich in Rhein province.

No. 393 is the W. P. C. brand of some German works.

No. 394 depicts the cement worker and his employer in a very friendly attitude. It is the brand of the Concordiahutte, at Engers am Rhein, Germany.

Nos. 395 and 396 are two German brands, manufacturers unknown to the writer.

No. 397 shows the design of the Blaubeurer Cement Fabrik, in Ulm, Germany. A free translation of this name would possibly be the *Blue Mountain Cement Co.*, which makes us turn our thoughts back home.

Nos. 398 and 399 are two more German brands.

No. 400 is the trade-mark of the Stettin-Gristower plant in Cammin, Germany.

New Lime Plant in Wisconsin

Construction is progressing rapidly, and indications are that lime will be produced about August 1 at the new plant of the Western Lime & Cement Co., at Green Bay, Wis. The property on which this plant is located is right in the heart of Green Bay on the west side of the Fox river between the Main street bridge and the Green Bay & Western R. R. crossing. The plant is served at this point by all of the big railroad systems of the Northwest.

The plant is a concrete and steel structure, 113 ft. x 69 ft. and a dock 500 ft. long is being constructed for unloading of stone, which will be imported from Rockport, Mich. in a self-unloading boat.

The structure proper and the kilns are on floating foundations of 35-ft. maple piling, as no bearing could be found anywhere along the river bank. The kilns weigh about 600 tons each and are supported on a concrete pedestal capped over 50 piles. Three kilns are being constructed, each one of a different type. One kiln is of the Arnold and Weigel type, which will be direct coal-fired, with steam regulation; the second kiln, designed by George W. Nast, general manager of the company, will also be coal-fired with steam regulation but with a different shaped fire-box and lining; the third kiln will be gas producer fired of a special design, by H. S. Owen, chief engineer of the company. All the refractories used will be Harbison-Walker Franklin Crown, while the linings will be Harbison-Walker Franklin Crown brick and the firing section and firing boxes of the kilns will be insulated with 4 in. of Sil-O-Cel against a steel shell which encloses the entire kiln and fire-box.

The capacity of this plant is rated at approximately 50 tons of lime per day. All power used will be electric and the stone will be charged from an electrically operated incline from the storage pile on the dock to the top of the kiln.

The entire construction is typical of lime usage in so far as all concrete work is mixed with hydrated lime. The brick mortar is lime mortar and the exterior stucco and interior plastering on the brick walls will also be of lime.

There is no high calcium lime in the state of Wisconsin and the stone in this case will be imported several hundred miles to satisfy the paper mill and tanning trade of the Fox river valley in which the plant is situated.

The Western Lime & Cement Co. is now operating 13 other plants and 5 hydrating plants, all of which burn and hydrate dolomitic magnesian lime products.

The analysis of the stone and the lime made from it are as follows:

Stone—from Rockport, Mich. quarries:

Loss on ignition	43.26%
Silica and insoluble matter	0.40%
Oxides of iron and aluminum	0.46%
Calcium Oxide	55.13%
Magnesium Oxide	0.54%
Calcium Carbonate	98.11%
Magnesium Carbonate	1.13%

Lime:

Loss on ignition	0.88%
Silica and insoluble matter	0.10%
Oxides of iron and aluminum	0.26%
Calcium Oxide	98.06%
Magnesium Oxide	0.55%
Calcium Carbonate	trace
Magnesium Carbonate	trace
Undetermined	0.15%

New Cement Plant in Wisconsin

Construction work has been started on a 3-kiln wet process cement plant for the Manitowoc Portland Cement Co., Manitowoc, Wis. The plant will be similar to that recently built by the Sandusky Cement Co. at Silica, Ohio.

Lime stone and local clay will be used in the manufacture of the cement and both coal and limestone will be received by boat and unloaded by a large bridge crane having a capacity of 300 tons per hour. This crane will handle material from the boat into storage and also from storage into the plant.

Under this crane, the company will have an ample storage capacity for raw material which will permit doubling the plant capacity later on. The kilns will be 10 ft. x 160 ft.

Contracts for the stock house construction and some of the heavy machinery have already been placed.

The Manitowoc Portland Cement Co. is a subsidiary company of the Newaygo Portland Cement Co. The capacity will be 3000 bbls. per day. It is the only cement plant in the state of Wisconsin.

The Newaygo Portland Cement Co. owns and operates the portland cement plant completed in 1901 at Newaygo, Mich., recently enlarged to a rated production capacity of 3000 bbls. per day. It has its own stone quarries at Charlevoix and Ellsworth, Mich.

A new issue of $1,500,000 in bonds has been arranged for by the Newaygo company to finance the new Wisconsin plant.

The following are officers of the Manitowoc Portland Cement Co.:

Charles C. West, president; J. B. John, vice president and general manager; H. Vanderwerp, assistant general manager; L. E. Geer, secretary and treasurer.

Portland Cement Production in May

With a production of nearly 13,000,000 bbls. of cement in May the cement industry of the country established a new high record for any single month. May production was more than 1,500,000 barrels greater than in April and 1,700,000 bbls. or 15% greater than in May, 1922. For the first five months of the current year production very closely approached the 50,000,000 bbbl. mark—14,000,000 bbls. more than in any similar period.

Shipments from the mills during May were also heavy and reached a total of 14,257,000 bbls. or 12% more than in May, 1922. For the five months' period ending May 31, shipments were approximately 48,900,000 as compared with about 34,600,000 during the first five months of 1922, the best previous record.

Stocks of cement in manufacturers' hands at the end of May were 10,115,000 bbls. as compared with an average on that date of 11,725,000 bbls. for the five year period—1919-1923.

Unusual activity in the construction field, early storing of cement and of late, the commendable record the transportation systems are making in handling traffic are responsible for the record breaking shipments of cement thus far experienced. With the very large programs of building and concrete pavement construction now in full swing, the year promises to be an active one in the cement industry.

Although stocks of cement have been decreasing since the first of March, May production was at the annual rate of approximately 155,000,000 bbls. which is considerably in excess of the amount consumed in any one year. Production will undoubtedly be still further increased by the recent placing in operation of two new mills and completion in the near future of extensions to several existing plants.

An Untrodden Field in Lime Research

By Oliver Bowles

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Mineral Technologist, U. S. Bureau of Mines

Wide research has been conducted in factory and laboratory to determine the physical and chemical properties of lime in their relation to utilization for various purposes. It is now generally recognized that limes vary greatly in their physical properties and chemical activities such as plasticity, rate of slaking, or rate of settling as milk of lime; but it is not so generally known that these variations in many instances bear no relation to the chemical composition of the original limestone. Limestones of identical composition may, under the same burning conditions, give limes that vary greatly in character. A definite relationship undoubtedly exists between the character of the lime and the physical properties of the parent limestone, but little serious effort has yet been made to correlate them.

In attributing honor where honor is due it is a noteworthy fact that to a woman must be given credit for the only important practical work that has yet been accomplished in this line of investigation. Miss Mary E. Squire, President of the Allwood Lime Co., Manitowoc, Wisconsin, spent four years of investigational work, and finally identified and isolated a particular limestone bed from which is manufactured a lime that commands a price as high as $200 a ton, because it fulfils the most stringent requirements of lime for processes of extreme refinement. Possibly other work of a like nature has been done, but if so it has received little publicity.

The importance of the problem has been brought to the attention of the Bureau of Mines from two other sources, one a lime producer and one a consumer. A prominent lime manufacturer is sufficiently aroused to the significance of the relation of finished lime to the physical properties of limestone that he has expressed a willingness to engage the services of a geological chemist to make a detailed microscopic study of the various formations in his quarry, together with a study of the limes produced. A specialist employed by one of the largest consumers of lime in the United States has written to the Bureau of Mines requesting information on this same subject. Such faint glimmerings betoken the approaching dawn of an active inquiry.

What are the controlling factors—the nature of the original organisms that provided the shells from which the stone was formed; the origin, whether chemically precipitated or fragmental; the degree of cementation or recrystallization; the grain size, grain shape or some other characteristic?

The problem undoubtedly has a direct bearing on quarry processes and on lime utilization, fields in which the Bureau of Mines is enlarging its activities; but so much remains to be done that pioneer work of varying character could be profitably undertaken by several agencies. The field is open; who will supplement our present meagre information?

Japanese Cement Industry Prosperous

Among the few industries unaffected by the current economic depression in Japan is the manufacture of cement. Road making and office buildings have taken large quantities during recent months, and although there is a cessation of large building operations at present, there is likely to be a continued expansion in road construction and other public engineering works.

The largest company is the Asano Portland Cement Co., with plants in Tokyo, Osaka, Moji, Kawaski, Hokkaido and Takao (Formosa). The annual output of this company is over 6,700,000 barrels. It is capitalized at 11,090,000 yen and earned during the calendar year 1922, 5,823,000 yen net profit. An annual dividend of 25 per cent was declared for 1922. Other smaller cement companies have declared dividends of 10 per cent or more.—*Commerce Reports.*

Cement Trade in Egypt

A late review of the cement situation in Egypt, where the local production prior to 1914 was but 20,000 tons of the 100,000 annually required, shows a great increase in cement of home manufacture:

> The Societe des Ciments d'Egypte and Nassanh has increased its facilities and improved its processes of manufacture to an extent permitting an annual output of 30,000 tons. Enormous quantities of raw material and low labor costs are factors making it possible for this company to practically control cement imports into Egypt as it can regulate its schedule of rates to the basis of European selling prices.
>
> Despite the high price of British cement, English importations were valued at about £E60,000 in 1921, against £E112,000 in 1920. The decrease is explained by the requirements of certain earlier State contracts the specifications for which called for English cement.
>
> Before the war Belgium occupied first place in the Egyptian cement market. That source of supply is now handicapped by high freight rates and the action of the Societe des Ciments d'Egypte in lowering its price to a point below that of the Belgian product.
>
> Cement of Dalmatian production, financed for the most part by Italian capital, holds the most important place in the Egyptian import market, due to its low price. Dalmation natural cements comply with usual specification requirements, but do not offer the guarantees of artificial cement although known as "rectified natural cement."—*Commerce Reports.*

The Associated Portland Cement Manufacturers Meet

At the general meeting of the Associated Portland Cement Manufacturers, Ltd., held on Thursday, April 12, Brigadier-General F. C. Stanley (the chairman), said that the period covered by the accounts had been a very difficult one for the cement trade. In view of the widespread depression caused by the unsettled state of international affairs and depreciated continental currencies which were seriously affecting business transactions throughout the world, the deliveries of portland cement in the home trade were less than those of the previous year. The tonnage exported, however, showed a substantial increase, although it was still well below pre-war quantities.

He referred to their acquisition of the works and other assets of the Kent Portland Cement Co. These were producing a bigger tonnage of cement than was originally anticipated, and at a satisfactory cost, while the quality was excellent. There was no doubt that in the Kent they possessed one of the finest and most up-to-date works in this or any country. They had had many delays in completing the works in India due to climatic conditions and strikes. They were now producing cement of an excellent quality, however.

In view of certain statements which had appeared in the Press, and for the general information of their consumers, he thought it desirable to say something regarding the cost of manufacture, and as to the selling prices of portland cement. In the years before the war it was possible to gauge prospective costs of manufacture almost to a nicety, certainly to within a shilling a ton, owing to the fact that the various items making up the total cost fluctuated within comparatively narrow limits. Since that date this had become utterly impossible for reasons which would be apparent; and even to-day, more than four years after the termination of the war, they were faced with violent fluctuations in the price of fuel, for instance, which was one of the largest items in their manufacturing cost. It had also been suggested that the price of cement was one of the factors holding up the building of houses. Even if they could reduce their price by a further 10s. per ton (which would absorb their full net profit) the cost would be reduced by £2 10s. per house, or less than 1%. The accounts and the dividend earned furnished, he thought, ample proof that the policy of reducing the cost of cement to the consumer had been carried to the extreme limit consistent with a modest return to the shareholders who had invested their capital in the company.—*Chemical Age.*

British Portland Cement Manufacturers Report Poor Year

The annual meeting of British Portland Cement Manufacturers, Ltd., was held on March 28, under the presidency of the Hon. F. C. Stanley, who stated that the associated company had purchased the works and other assets of the Kent Portland Cement Co., Ltd., and had guaranteed the issue by that company of £6,600,000 of Kent 6½% debenture stock. The dividend was maintained at 10%, but trading conditions were very difficult; the demand was very small, and the turnover was less than in the previous year. It was to be regretted that certain public authorities had placed contracts for cement, etc. with continental manufacturers assisted by depreciated currencies. The immediate outlook was not as promising as could be wished, for but little reduction in the cost of manufacture could be expected. The reductions already made in the selling prices would exceed any possible saving in manufacturing costs. Nothing was being neglected to increase the use of cement, and the use of concrete in road construction was being vigorously advocated.

Market for Building Cement in Portugese East Africa

Annual imports of building cement into Portuguese East Africa amount to nearly 10,000 tons. The material is used principally by the railways, but a large proportion is employed in the construction of residences in the larger towns. The greater part of the cement is purchased from the Transvaal, though some is imported, notably from Germany and Great Britain. A small amount comes from the United States, but the freight differential, due to distance and lack of return cargoes, renders it very difficult for the American article to compete. In addition, the territory of the Mozambique Co. imports for its own use about 1,500 tons annually—*Commerce Reports.*

Men and Mills

Notes from the Field

The Atlas Portland Cement Co. of Kansas has been incorporated to acquire the property of the Western States Portland Cement Co., at Independence, Kan.

The well-known quality and uniformity of "Cowboy Brand" which has heretofore been manufactured in Independence is already established. The Atlas company will link with this quality the same dependable service which has been maintained for over a quarter of a century.

Among the recent shipments made by the Ruggles-Coles Engineering Co. of Ruggles-Coles dryers for use in the cement, sand and stone industries are numbered the following: Aetna Portland Cement Co., Bay City, Mich., 1 dryer for coal; Vulcanite Portland Cement Co., Vulcanite, N. J., 2 dryers for coal; Knickerbocker Portland Cement Co., Hudson, N. Y., 2 dryers for coal; Blue Mountain Stone Co., Delta, Pa., 1 dryer for stone; Permutit Co., Burlington, N. J., 1 dryer for sand; Uvalde Asphalt Paving Co., Brooklyn, N. Y., 2 for sand and stone.

Paul C. Van Zandt, formerly chief engineer of the Asano Portland Cement Co., of Japan, has severed his connections in Japan and will arrive in the United States about August 1, with his family after an extensive trip through Europe.

Mr. Van Zandt's journey was by way of Hong Kong, Singapore, Colombo and Suez to Marseilles. From there he went to the Riviera, through Italy and Switzerland and into Spain to visit a couple of cement plants near Barcelona. His schedule calls for leaving Paris about July 1 and sailing from London for New York on or before July 10.

Mr. Van Zandt hopes to make permanent connections in the United States upon his return.

Prior to his stay in Japan, Mr. Van Zandt was connected with the Allis-Chalmers Mfg. Co. and he now occupies a place among the foremost authorities of the World on questions pertaining to the construction and operation of cement plants and cement and crushing machinery.

The Newaygo Portland Cement Co., of Newaygo, Mich., expects to spend $350,000 for new machinery in the near future. Waste heat boilers are being installed at the present time.

The Spencer Construction Co., contracting engineers, Baltimore, Md., has just completed a new 200,000 bbl. silo stock house for the Lehigh Portland Cement Co., at Birmingham, Ala.

Among other projects, contracts for which have been awarded to the Spencer Construction Co., are: the new silo stock house, slurry tanks, water tanks, clinker storage and miscellaneous work for the Pittsburgh Plate Glass Co., at Zanesville, Ohio, and the silo stock house, mixing bins and gypsum bins for the National Cement Co., to be erected in Montreal, Canada.

An application which was filed before the Alabama public service commission by the Louisville & Nashville Railroad, for the readjustment of railroad rates on cement, lime and plaster shipped from Birmingham to points in South Alabama, were withdrawn by the railroad company when the matter came before the commission for a hearing. Consequently these rates remain as they formerly were.

The Edgemoor Iron Co. furnished and installed four waste heat boilers of 1189 horsepower each, with specially designed Foster superheaters, Foster economizers and Green Fuel Economizer Co.'s fans in the new waste heat plant of the Alpha Portland Cement Co. at Martin's Creek, Pa.

The Michigan Portland Cement Co. is installing a new Sandvik steel belt for conveying coal in the coal department of its plant at Four Mile Lake, Mich. This is the second steel belt installation put in under the direction of L. L. Griffith, superintendent of the plant, the first installation having been in successful operation in handling clinker.

Frank H. Davis, works manager of the Santa Cruz Portland Cement Co., has severed his connection with that company after having served it for 18 years. Mr. Davis went to California from New York in 1905 to take over the management of the Santa Cruz compa

The Arrowhead Portland Cement Co. is planning on the erection of a cement plant in the vicinity of San Barnardino, Calif., and according to reports from that locality, the daily output will be 1500 bbls. and production will be started some time in 1924.

A new silo storage plant has been completed at the plant of the Trinity Portland Cement Co., at Eagle Ford, Tex. Two 24-ft. Cyclone dust collectors are being installed, one on each stack in connection with the waste heat boilers.

Two 50-ft. x 10-ft. burning zones have been added to the kilns which were originally 8 x 125 ft. making the kilns 8 ft. x 10 ft. x 125 ft. The same type of burning zone will be added to the three remaining kilns so as to bring the total production of the plant up to a rated capacity of 6000 bbls. per day.

The Sandusky Portland Cement Co. is replacing tube mills formerly used for grinding coal by installing seven Fuller mills in its coal grinding departments.

A new addition is being made to the office building of the Cape Girardeau Portland Cement Co., Cape Girardeau, Mo.

The B. F. Sturtevant Co. has purchased the plant of the Wisconsin Engine Co. at Corliss, Wis. and has placed Harry W. Page as general manager in charge. The Sturtevant company has long felt the need of a manufacturing plant in the middle west.

As almost every installation calls for specific engineering, it has been found difficult and expensive at times to give full attention to this westward business from Hyde Park. A full manufacturing and engineering staff will be maintained and closer cooperation given to western customers.

In order to provide more adequate facilities for the increasing volume of business in the Pittsburgh District, the Pennsylvania Crusher Co. has recently moved its offices from the Peoples Bank Building to more adequate quarters in the Oliver Building, where operations will be continued under the management of H. M. Hallett, as district manager.

The business of the Pittsburgh office is largely concerned with "Pennsylvania" coal preparation machinery for mines, by-product coke plants, central stations and industrial power plants, and with heavy duty primary and secondary crushers for large cement and lime plants.

Considerable new work is being done along the line of cement storage and packing plants, for various cement companies by the MacDonald Engineering Co., of Chicago. Among the more recent installations are the following:

Eight 32-ft. x 80-ft. bin stockhouse and packing plant having a capacity of 160,000 bbls. for the Hawkeye Portland Cement Co., Des Moines, Ia.; ten 24-ft. x 80-ft. bin stockhouse and packing plant having a capacity of 120,000 bbls. for the Ford Motor Co., Detroit, Mich., in connection with the new cement plant at River Rouge; twelve 35-ft. x 80-ft. bin stock house having a capacity of 310,000 bbls. for the Oklahoma Portland Cement Co., Ada, Okla.; twelve 34-ft. x 80-ft. bin stockhouse, having a capacity of 300,000 bbls. for the Northwestern Portland Cement Co., Mason City, Ia.; six 33-ft. x 80-ft. bin stockhouse with a capacity of 125,000 bbls. for the Sandusky Cement Co., Silica, Ohio, and six 32-ft. x 71-ft. 6-in. bin stockhouse, having a capacity of 110,000 bbls. at the Bay Bridge, Ohio plant of the same company.

The MacDonald Engineering Co. has also closed a contract with the International Cement Corp. as a result of which the MacDonald company is designing a new cement stockhouse in Cuba.

The Colorado Portland Cement Co. has been awarded contracts by the United States reclamation service for 17,000 barrels of cement, the shipment to be made to Riverton, Wyoming for irrigation purposes. Another contract for about 10,000 barrels of cement for irrigation work on the Grand Valley, Colorado project will amount to $26,500.

Charles Boettcher, president of the Cement Securities Co., has been re-elected second vice president of the Great Western Sugar Co., a Colorado concern.

The Phoenix Portland Cement Co. at North Birmingham, which recently started making cement, will soon have another unit of its plant in operation.

The Lehigh Portland Cement plant at Tarrant City, which is another new plant, in the Birmingham district, will be in operation early in September, or before.

Henry Woodland, secretary and treasurer of the Allis-Chalmers Manufacturing Co., died suddenly at his home in Milwaukee on Monday, May 14.

Born in Utica, N. Y., Mr. Woodland at an early age became connected with the New York Air Brake Co. of Chicago. Later he was treasurer of the Gates Iron Works of Chicago. When in 1901 the Gates company was taken over in the consolidation which formed the Allis-Chalmers Co., he became assistant treasurer of the new organization and afterward its treasurer. In 1916, he was elected secretary and treasurer of the company.

At the time of his death, he was also vice president and a director of the Hanna Engineering Co. of Chicago.

If a cement plant were to be built in Minnesota for the manufacture of cement from marl, Prof. R. E. Kirk, of the engineering college, University of Minnesota, who headed the investigation for which money was appropriated by the 1921 Minnesota legislature, suggests that it should be constructed near the Twin Cities. This location, it is stated, would give the company access to the Twin City market and at the same time would furnish protection from the competition of Iowa cement plants to the south and the Duluth plant to the north.

The mills of the Colorado Portland Cement Co. are operating at full capacity. The orders on the company's books are sufficient to justify the statement that it will do an average year's business, and no shut-down is expected.

The location of some of the mills is on the Denver Rio Grande and Western Pacific railroad, and to that railroad will devolve the duty of handling much of the fruit that is grown in the Grand Valley of Colorado. There will probably be some delay due to car shortage when the fruits commence to move. Just what the effect on the cement mills will be is problematical, but the company's officials are optimistic for the year.

The cement plant licensing bill introduced in the Oklahoma state legislature was declared by Senator Ross Lillard as discriminating against cement plants in Oklahoma in favor of cement concerns operating in bordering states. With everything equal, he believes that the business concerns of his own state should get the trade of the state.

Mr. Lillard charged that an effort was being made to dodge the issue of the cement plant asked for by the Governor by saying that cement plants now existing in the state will be regulated. He believed that the supervision of business by the state could be carried so far as to kill competition in trade.

In reply, it was argued that cement plants should be placed under the supervision of the corporation commission as provided by the bill, as Oklahoma was paying more than was justified by reasonable rates. It was claimed that from 200 to 300% more was being charged for cement at the present time than in 1915 and that there had been no such increase in the cost of production.

Following the longest single day's session yet held by the Senate, and after that body had been locked up on a call of the house while the sergeant-at-arms scoured the city of Sacramento to bring in missing members, the Senate of California passed the bill which provides that the state of California shall go into the business of manufacturing cement. The vote cast was 21 ayes as against 16 nayes.

The Whitehall Cement Manufacturing Co. has installed a large Kominuter constructed by F. L. Smidth & Co. with a rated capacity of 125 bbls. an hour. In a test, running over 10 days, 140 bbls. per hour were produced by the mill. A second Kominuter is being made and will be installed by the Whitehall company early next year.

Russell L. Hardy has recently become associated with the Ohio Hydrate & Supply Co. as chemical engineer. Mr. Hardy has charge of research and inspection work and his department will be operated to insure absolute uniformity of the company's product.

In employing a chemical engineer, it is the purpose of the Ohio Hydrate & Supply Co. to develop new uses for lime and better its present uses.

The cover of the May-June 1923 issue of *Contractors Atlas* issued by the Atlas Portland Cement Co. is made from the strong paper used for Atlas paper cement bags. It is explained that a good many Atlas users have never ordered Atlas in paper bags and so are not familiar with the strength and quality of the paper used.

The paper is described as an extra heavy all-rope paper and the basis of it is old manila rope.

The following advantages of paper bags are mentioned for cement users to bear in mind when considering whether or not to order cement in paper bags:

First: Stolen, misused and lost cloth cement bags cause loss which does not apply to the non-returnable paper bag.
Second: Cleaning, sorting, bundling and storing cloth bags is an expense eliminated with paper bags.
Third: Hauling and freight on empty cloth bags are eliminated and no money is tied up in bags.
Fourth: Paper bags are more easily handled on the job—no time lost in untying and shaking as with cloth bags. A paper bag is just ripped open and the cement slides easily and quickly into the mixer.

Good progress is being made with the new cement plant which the Columbia Chemical Division of the Pittsburgh Plate Glass Co. is erecting at its quarry at Fultonham, Ohio. Work is being rushed on the foundations and steel work in an endeavor to get the plant under cover before the bad weather sets in in the Fall.

All equipment for the mill and power house has been contracted for and it is planned to have the plant ready for operation sometime during February or March of next year.

The largest shot ever made by the Louisville Cement Co. at the Milltown, Indiana plant was made April 28. The following amount of explosives and fuse was used: 63 cases Trojan powder, 3,150 lbs; 110 cases Dumorite dynamite, 5500 lbs.; 150 cases Gelatin dynamite, 7500 lbs., or a total of 16,150 lbs. dynamite with 2,503 ft. of Cordeau Bickford Guarantee fuse. It is estimated that 75,000 tons of rock were shot down by this shot of high explosives.

The Macdonald Engineering Co. has recently been awarded the contract for the designing and construction of the stockhouse, packing and bag houses in connection with the new cement plant which will be built at Manitowoc, Wis., under the name of the Manitowoc Portland Cement Co. The storage will consist of 6 bins 36 ft. x 80 ft. with side pockets and interspaces with a capacity totaling approximately 154,000 bbls. of cement. The packing and bag houses will be 4 stories and basement, 50 ft. long and 75 ft. wide. The buildings will be on piling foundation, piles for which are being driven and it was estimated that concreting would commence about July 1.

A new type of synchronous motor has recently been developed by the General Electric Co., Schenectady, N. Y., for driving tube mills. The company has not only completed its tests on this machine at the factory but has had it in actual operation at the plant of the California Portland Cement Co. for two or three months and it has proved so successful that a large number of orders are reported by the General Electric Co. for similar motors for driving cement mills in other plants.

The Riverside Portland Cement Co. has purchased the plant and property of the Golden State Portland Cement Co., located at Oro Grand, Calif. The Golden State plant where the Bear brand is produced, originally comprised two 8 x 125 ft. kilns. The Riverside company is adding three additional kilns of the same size and expects to have them all in operation by September 1.

Plans for a new plant in Arizona have been postponed temporarily while the company is busy getting its Oro Grand plant under way.

John E. Zahn, general manager of the United States Portland Cement Co. is quoted as saying that that company's industry would not be particularly affected by the construction holiday suggested by Secretary of Commerce, Hoover. "Our production is always ahead of the demand. Naturally, if there were a complete cessation in all building operations, in paving and other lines where cement is used, it would affect us, but I do not believe that we would curtail our own production. It might be well for a let up in all construction until all can get on the same level again. One of the errors in such booms as now prevail throughout the country is the construction of many houses that are not standard; that is, they do not contain the class of material they should nor is the work as good as it should be."

Charles J. Reilly, for the past two years superintendent of the Sandusky Cement Company's plant at West York, Pa., died at his home in York, Pa., May 26.

Leaders in the cement industry in Mason City, Ia. notwithstanding the backward weather of the spring, are optimistic in their outlook for a good year. They believe prices are right and an intensive selling campaign is being put on to induce buyers to stock while the railroad situation is easy and cars can be obtained in which to make shipments. The product of the two Mason City plants is approximately 12,000 bbls. per day, most of which is shipped to points in Minnesota and Iowa.

The Nazareth cement plants are rushed with orders and are running at a maximum capacity. The drive in the Lehigh region is on in earnest, the mills working at practically a capacity basis. Most of the companies have announced wage increases.

A train of thirteen cars loaded with cement was recently derailed just outside the yards of the Lehigh Portland Cement Co., near Allentown, Pa., when it reached a section of track which was being repaired.

A preliminary injunction against operation of the Lehigh Portland Cement Co. at New Castle, Pa. has been granted by Judge S. P. Emery, on application of east side residents.

The West Catasauqua yard of the Philadelphia and Reading railroad is having the busiest time of its existence. During April approximately 8,000 cars of cement were handled through the yard to the Ironton railroad, which handles freight shipments to and from the Lehigh cement region.

The number of immigrants in the vicinity of Coplay, Egypt and Northampton, which has been quite large during the first three months of the year has been checked by the completion of the quotas from the various places from which they come. Cement officials in this locality state that business in general is more brisk than at any pervious period for this time of year.

The Lehigh Coal & Navigation Co. has the canal system between Mauch Chunk and Philadelphia, a draw of 100 miles, in shape for the coming season. Owing to considerable trouble experienced at times, cement industries in Northampton, Coplay, Egypt and Ormrod are seriously considering the use of the canal for heavy consignments of cement that have been contracted for at many cities along this water front.

The Lehigh Portland Cement Co., owners and founders of the Lehigh Community Park & Playground, Fogelsville, situated north of the Fogelsville plant, opened the popular resort on Memorial Day.

Samuel Eichel, purchasing agent for the Coplay Cement Co., has been admitted to membership in the Lehigh Valley Purchasing Agents' Association.

Cooperation Urged at the Acme Plant

At a recent dinner given the department heads and foremen by the Acme Cement Corp., Catskill, N. Y., the necessity of cooperation by the men in authority as an absolute requisite of constant and maximum production was stressed by R. S. Shultz, Jr., who has been manager of the Acme plant since January 15. Other speakers were: L. G. McConnell, treasurer and sales manager, and Donald B. Watt, vice president.

The gathering of leaders of the plant was the first of the regular meetings for foremen which are to become part of the plant routine. It was pointed out that the extensive alterations in the plant layout and equipment were considered of secondary importance to the organization of the working force. A change was announced from a two-shift day to a three-shift day for the operating force, with the men working nine hours, so as to bring about an overlap of one hour between shifts. This, it is anticipated, will result in an uninterrupted running of the machines and a clean plant.

The nine-hour day is to be the working day for all other departments in the mill, including machine shop, yard, packing department and quarry. The employees will be paid practically the same wages for nine hours as they were formerly for twelve or ten, whichever they happened to work.

Two new departments were announced: a maintenance department which was formerly a part of the operating department, and a personnel department. The latter will take charge of hiring the help, making promotions, hearing grievances which may come up and attending to the safety program and the health of the employees.

Equipment Information Centralized

Catalogs of a great number of equipment and material companies, members of the Chemical Equipment Association, are now on display at the executive offices of the Association, 1328 Broadway, New York city. These catalogs, in addition to which many photographs of other information are included, have been made available for reference not primarily as an aid to sales of equipment, but to afford members of equipment-using industries a readily accessible centralized source of general data. Access to these catalogs is available to anyone whose business card or credentials evidence a legitimate interest in them, and examination of them will be unhampered.

Freight Car Shortage Again

That with the memory of the 1922 traffic congestion still fresh in mind, figures point to an even greater one in 1923 is cited by the *Universal Dealer*, issued by the Universal Portland Cement Co. To offset the effect of this shortage, in some measure at least, it has been found necessary to issue shipping instructions on existing cement contracts immediately, so that the material may be scheduled for shipment at the earliest possible moment.

Even under these conditions it is stated, there may be some delay, because a car shortage already exists in many sections of the country; but compared with the probable delay of later months, this is inconsiderable. It is always worth remembering, that in time of freight congestion—*A car of cement in the warehouse is worth two on the way.*

Freight Rates in the West

Railway tariffs suspended until September 12 by the Interstate Commerce Commission pending investigation propose to cancel the through carload rates on cement from Continental and Prospect Hill, Mo., to Louisville & Nashville R. R. stations in Illinois, the effect of which would be that shipments from the Missouri mill points to local stations on the L. & N. in Illinois would be assessed switching charges in addition to the St. Louis rate, applicable at present from those points without the addition of such switching charges. These schedules were filed to become effective May 15 as published in Supplement No. 6 to Agent E. B. Boyd's tariff I. C. C. No. A-1343.

A proposed reduction in the rate on cement between Bonner Springs, Kan., and Kansas City, Mo., from 6½c to 4½c per 100 lbs. and an increase in the minimum carload weight from 50,000 to 80,000 lbs. has been suspended until August 27 pending investigation by the Interstate Commerce Commission. The operation of the proposed rate was to become effective April 29 as published in Supplement No. 3 to Kansas City, Kaw Valley and Western Ry. Co.'s tariff, I. C. C. No. 29.

New Gelatin Reduces Fumes

A new improved form of gelatin has recently been placed on the market by the Atlas Powder Co., for which extraordinary results are claimed not only in all around efficiency as an explosive but also in respect to the negligible amount of fumes evolved. It is reported that in one instance where the gelatin was being used on a large tunnel operation, the men could return to work in 12 to 18 minutes, while with the old style gelatin, it required at least 30 minutes before operations could be resumed.

In addition to these advantages, the manufacturer of this new explosive advises that it is extremely high in water resistance and also, practically perfect in plasticity, two properties that are of extreme importance in most underground operations, where wet work is often encountered and where loading in upward or pitching holes is necessary so frequently.

Ching Ching Cement Company

It is reported that another new cement works is going to be started by the Ching Ching Coal Mine situated in the North. The large stockholders are men of political importance such as President Li Yung Hung, Ex-premier Tuan Chi-je, etc. General Ting is the general manager of the company.

The capacity of the mill will be 2000 casks per day. Many prominent American and German import and export companies have bid for the contract for the complete set of cement machinery. They expect to start operation sometime in the year of 1925.

Biography of Colloid Chemistry

A bibliography of colloid chemistry has recently been issued by the National Research Council. The author, Dr. Harry N. Holmes of Oberlin College, Chairman of the National Research Council Committee on Chemistry of Colloids, intends this edition to be preliminary to a more comprehensive one. It is a book of 135 pages, containing 1800 references on 106 topics. All references are classified and many are accompanied by brief comment as an aid in deciding on their relative importance.

Among the classified groups are: cements, clays and soils. This book may be purchased from the Washington office at $1.00 per copy.

Trade Publications

Pennsylvania Hammer Crushers for Cement Rock and Limestone. Bulletin 1005. Size 8½ in. x 11 in., 16 pages, illustrated. Issued by the Pennsylvania Crusher Co., Philadelphia, Pa.

This new bulletin illustrates and describes the complete line of heavy duty Pennsylvania steel-built hammer mills developed by the Pennsylvania company during the past 25 years for secondary and finer reductions of limestone, cement rock, gypsum, shales and similar materials for cement, lime and gypsum plants, and for brick, chemical and other manufacturers employing materials which have to be reduced in this manner. Brief mention is also made of the Pennsylvania Giant single roll crushers for primary reduction of all limestone, cement rock, etc., and special emphasis has also been laid on the unique ability of the Pennsylvania crusher to automatically eliminate tramp iron from the product without damage to the machinery.

Armstrong All-Steel Blast Hole Drill, bulletin No. 81, by the Armstrong Manufacturing Co., Waterloo, Ia. This bulletin is 8 in. x 10½ in., 24 pages with paper covers.

It is completely illustrated and describes the special features of the Armstrong all-steel blast hole drill. The frame, patent wire line derrick, tractor attachment, tractor drive, unit power plant, clutch, engine, electric motor equipment and reversing transmission are described in order.

The Westinghouse Supply Catalog generally regraded as an encyclopedia of things electrical is now being distributed. This issue for 1923-24 replaces and supersedes all catalogs is suedheretofore on electrical supplies by the company.

The former editions of the catalog have proved so useful and satisfactory that no essential features were altered, the improvements being largely a matter of detail and refinement.

The catalog is indexed according to subjects and to sections, and also has a style number and a thumb index. In addition, a new feature—a classified index—has been added to the introductory section under the title "How this catalog serves." Here is listed apparatus of particular interest to Central Stations, Electric Railways, Industrial Plants, Mines, Contractor-Dealers, and Architects.

In all, 1300 pages are devoted to descriptive matter, technical data, dimension drawings, specifications and prices. The material includes all new apparatus developed in the last two years.

New Books

Pit and Quarry Handbook for sand, gravel, stone, cement, gypsum and lime industries. Size 6 in. x 9 in.; 332 pages; illustrated. Flexible binding, price $5.00. Complete Service Publishing Co., Chicago, Ill.

This is a comprehensive reference work on all phases of operation, standard practices, equipment and supplies, formulae, tables, data, etc. for operators in the pit and quarry. The publishers plan to make the Handbook an annual publication with the addition of new features, improvements in the style of presentation each year. Chapters are devoted to production of the various materials derived from the pit and quarry. Other interesting subjects treated are Injuries and their Treatment, Statistics of Production and Electrical Shot Firing Regulations.

The book also contains a catalog section, classified buyers' guide and trade names index.

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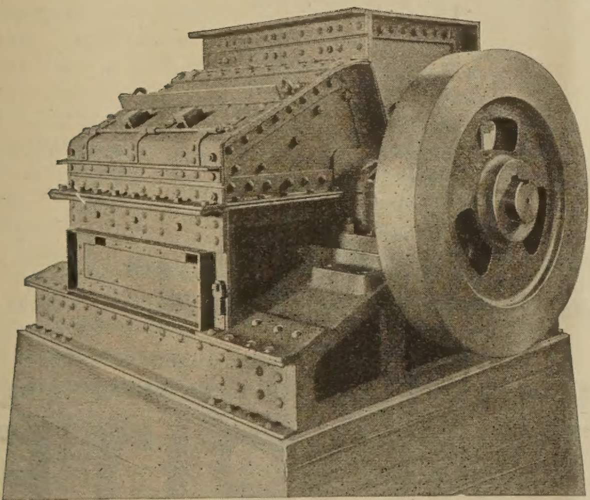

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New Bulletin 1005 on "Pennsylvania"
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DUMORITE

THE LATEST OF A COMPLETE LINE OF DU PONT EXPLOSIVES
Nitroglycerin, ammonia, gelatin and other types of explosives designed to meet every blasting requirement at least expense.